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ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

HEARINGS

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDREDTH CONGRESS

FIRST SESSION

ON THE

REPORT OF THE SECRETARY OF THE INTERIOR TO THE CONGRESS REGARDING OIL AND GAS LEASING ON THE COASTAL PLAIN OF THE ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

JUNE 2, 4, 11, AND 12, 1987

PART 1

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ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

TUESDAY, JUNE 2, 1987

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 9:35 a.m., in room SD-366, Dirksen Senate Office Building, Hon. J. Bennett Johnston, chairman, presiding.

OPENING STATEMENT OF HON. J. BENNETT JOHNSTON, A U.S. SENATOR FROM THE STATE OF LOUISIANA

The CHAIRMAN. The hearing will come to order.

Today the Committee begins consideration of the Secretary of the Interior's report to the Congress regarding oil and gas leases in a 1.5 million acre portion of the Arctic National Wildlife Refuge in Alaska, known as ANWR, on the Coastal Plain.

This issue comes before the Committee as a result of Congressional action in 1980 through the enactment of the Alaska National Interest Lands Conservation Act [ANILCH]. Section 1002 of that Act directed the Secretary of the Interior to study:

One, the oil and gas potential of the Coastal Plain;

Two, the wildlife and other surface resource values of the area;

And three, the area's wilderness potential.

The Act required the Secretary to forward this report to Congress along with his recommendations as to if, when, and how all or a portion of the Coastal Plain should be made available for oil and gas exploration, production, and development.

It is important to note that the Congress reserved to itself the right to decide whether future development in this area should take place. The Coastal Plain is closed to any further exploration and is off limits to oil and gas production and development unless Congress acts to open the area. In fact, under the terms of Section 1004 of the ANILCA, the Coastal Plain is to be managed as wilderness until Congress determines otherwise.

The provisions were written into the Act because we recognized that ANWR offers outstanding wildlife, scientific, recreational, and esthetic values unique to the Arctic coastal ecosystem.

Within the boundaries of this 19 million acre refuge, one finds the full complement of Arctic flora and fauna, including the calving grounds for the Porcupine caribou herd, habitat for a number of threatened bird and mammal species, and a relatively large musk oxen herd which was reintroduced to this area in 1969.

At the same time, we knew that the North Slope of Alaska is an area with an excellent potential for large oil and gas reserves. The

Coastal Plain of ANWR is located just 65 miles east of Prudhoe Bay, the largest oil and gas field ever found in the United States.

Current production from this field averages some 1.8 million barrels of oil per day, more than 20 percent of the U.S. domestic crude oil production. It is clear that significant portions of the Coastal Plain are very similar geologically and geophysically to the subsurface of the Prudhoe Bay area.

It was the recognition of these competing values that led the Congress to include the 1002 study in the Act in the first place. That study has now been completed and the Secretary has recommended that the entire Coastal Plain of ANWR be made available for oil and gas leasing.

While the study documents the likelihood of some adverse impacts on various resources in the area associated with production and development, the Secretary has concluded that such impacts can be minimized and that the nation's need for additional domestic oil and gas reserves outweighs these potential negative impacts.

Not surprisingly, not everyone agrees with the Secretary's recommendations. Some people believe that existing wilderness character of the Coastal Plain should be preserved because the area's national value as wilderness outweighs any oil and gas potential.

Others believe that, even if the nation is willing to forgo the wilderness value of the Coastal Plain, the area should not be opened to oil and gas leasing. These individuals believe that the potential negative impacts on the wildlife and fish of the area are too great and the chance of finding significant oil reserves too small to risk the imposition of a full-scale oil and gas leasing program in this area.

Still others believe that the study itself is inadequate and that more and better information must be gathered before a final decision is made.

It is in this context that the Committee begins its deliberations on this issue.

In November, shortly after the election, I was asked how the Committee would deal with the ANWR issue. At that time I indicated that there would be no rush to judgment.

I said that the Committee would listen to both sides and gather the information necessary to make a rational and comprehensive decision.

We are beginning that process today with Secretary Hodel. On Thursday the Governor of Alaska and representatives of the Alaska Native community will express their views. Next week, on Thursday and Friday respectively, the conservationists and representatives of the oil and gas industry will each make their case.

Later this summer, some of us will be going to Alaska to look at this area firsthand. Later this summer or fall, hearings will likely be held on the then pending legislation dealing with the issues.

Senators Murkowski and Stevens have already introduced a leasing bill, and other bills may very well be introduced. It will be an interesting, not to say fascinating, set of hearings.

And we are very pleased to welcome as our first witness our friend, Secretary Hodel. But before we hear from Secretary Hodel, I would like to ask if my colleagues have any comments.

Senator Bingaman.

STATEMENT OF HON. JEFF BINGAMAN, A U.S. SENATOR FROM THE STATE OF NEW MEXICO

Senator BINGAMAN. Mr. Chairman, I have a short opening statement I will put in the record. I do think it is an important issue, and obviously a very controversial issue. I look forward to the Secretary's testimony.

[The prepared statement of Senator Bingaman follows:]

Statement of Senator Jeff Bingaman
Hearing on the Arctic National Wildlife Refuge
June 2, 1987

I thank the Chairman for scheduling this first in a set of hearings on one of the most important and controversial issues this Committee will consider during the 100th Congress. Today's hearing is the first of four hearings this month to review the report by the Secretary of Interior regarding oil and gas leasing on the Coastal Plain of the Arctic National Wildlife Refuge (ANWR) in Alaska.

The area we consider today is one of 16 National Wildlife Refuges in Alaska and is home to a full complement of arctic flora and fauna, including the calving grounds for the Porcupine Caribou herd, one of the largest in Alaska. ANWR is also the habitat for the threatened Arctic peregrine falcon and other migratory bird species.

At the same time, the coastal portion of ANWR has been recognized as a particularly promising area for oil and gas. This becomes an increasingly important consideration as we face growing concerns for our nation's energy security.

Statement of Senator Bingaman
Hearing on Arctic National Wildlife Refuge
June 2, 1987
Page 2

This committee faces the difficult task of striking a balance between our national objectives of protecting and preserving our wildlife refuges and wilderness areas and achieving energy independence. I look forward to working with my colleagues on this issue and to reviewing the testimony of all our witnesses.

The CHAIRMAN. Senator Wirth.

STATEMENT OF HON. TIMOTHY E. WIRTH, A U.S. SENATOR FROM THE STATE OF COLORADO

Senator WIRTH. I would like to have my statement put in the record as well, Mr. Chairman.

I am waiting with a great deal of interest to hear the justification for opening up ANWR at a time when it does not appear to me we are taking appropriate steps on a variety of other energy initiatives, and I would hope that we might close this hearing process with a commitment to a broader energy policy, not one that is limited to developing this particular area's potential for oil and gas.

Thank you.

[The prepared statement of Senator Wirth follows:]

OPENING STATEMENT OF THE
HONORABLE TIMOTHY E. WIRTH

Mr. Chairman, I want to thank you for scheduling these hearings, and for your leadership on the question of whether the Congress should authorize exploration and development of potential oil and gas reserves in the coastal plain of the Arctic National Wildlife Refuge. This is a very important issue -- perhaps the conservation issue of the 100th Congress -- and I believe that the careful and deliberate course you have plotted for this Committee is a sound one.

I just mentioned that the Congress's decision on leasing the coastal plain may be the conservation vote of the 100th Congress, and I believe that is true. The wildlife resources of the coastal plain are, in a word, extraordinary. The coastal plain clearly qualifies as wilderness.

And this Committee must examine carefully a wide spectrum of environmental issues that surround oil and gas development in the Arctic region. For example, have toxic materials leached from reserve pits to contaminate shallow lakes in the Prudhoe Bay area? Have the companies indeed used liquids from the reserve pits to water down gravel roads during the summer, as a technique for reducing dust. And what level of air and water pollution would occur at different levels of development in the coastal plain?

Those are important issues, Mr. Chairman, and I look forward to these hearings as a forum in which those questions can be answered. But there is another dimension to this controversy as well. The decision of whether the Congress should authorize exploration and development of the coastal plain can not occur in a vacuum. It must occur in the context of this nation's energy policy -- or the lack thereof.

The Secretary of the Interior has recommended full scale leasing of the coastal plain, and has invoked our memories of energy shortages to justify that decision. And the members of this Committee are fully aware of how important the discovery of a large quantity of economically recoverable oil in the coastal plain could be to the Nation's energy security.

But this is the same Administration that has rolled back the Corporate Average Fuel Economy Standards, and has recommended repeal of the law setting CAFE standards. This Administration has slashed funding for research on conservation, solar and other renewable energy sources, and even for fossil fuels. And our efforts to impose a fee on imported crude or to somehow control the volatility of oil prices consistently have been opposed by this Administration. This Administration even proposed that we defer addition of crude oil to the Strategic Petroleum Reserve.

Mr. Chairman, as sure as we are sitting here there is going to be another energy crisis. I am as committed to developing a sound, comprehensive national energy policy as anyone else in this room. But we can not realistically address the question of leasing the coastal plain without addressing these other issues.

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May 18, 1987

TO : Senate Committee on Energy and Natural Resources
Subcommittee on Energy Regulation and Conservation
Attention: Al Staymen

FROM : Fred J. Sissine
Analyst in Science and Technology
Science Policy Research Division

SUBJECT: Impact of CAFE and Speed Limit Rollbacks on Oil Import Spending

This memo responds to your request for estimates of the maximum impact which rollbacks of the Corporate Average Fuel Economy (CAFE) and 55 mile-per-hour (mph) speed limit could have on national oil use and spending for oil imports. As requested, estimated oil use impacts are compared to the average daily delivery rate of the Alaskan pipeline.

(1) Rollback of the 55 mph Speed Limit.

Mr. Phil Patterson of the Department of Energy (DOE) reports that establishment of the 55 mph speed limit reduced national gasoline use by about two percent. He estimates that the rollback to a 65 mph speed limit will cause use to rebound by about one percent, nearly half of the savings achieved by instituting the 55 mph limit.[1] Assuming that U.S. motor vehicles use 123.2 billion gallons of gasoline annually,[2] a one percent increase would amount to about 1.2 billion gallons of gasoline per year. Assuming that 42 gallons of gasoline is equivalent to one barrel of crude oil, this would result in an increase of about 0.08 million barrels per day (bpd). This represents about four percent of the Alaskan pipeline delivery rate, which is estimated at about two million bpd.[3] Assuming that crude oil costs about $20 per barrel, this would increase oil import spending by about $0.6 billion per year.

---

[1] Personal communication with Mr. Phil Patterson, Manager of the Transportation Conservation program, May 15, 1987.

[2] U.S. Dept. of Energy. Oak Ridge National Laboratory. Transportation Energy Data Book: Edition 9, (ORNL-6325) Apr. 1987. Table 1.14, p. 1-24. This figure represents total gasoline use in 1984. Because it predates the sharp gasoline price drop of 1986, it may significantly underestimate total consumption.

(2) Rollback of the CAFE Miles-per-Gallon (mpg) Standard.

After CAFE took effect in 1978, the national fleet efficiency increased from 14 mpg to 18 mpg in 1985.[4] In the long-term, as older and less efficient cars are retired, national efficiency will continue to increase, approaching the CAFE level. Thus, the Secretary of Transportation's decision to rollback the CAFE standard from 27.5 mpg to 26.0 mpg could have a significant impact on fuel use and oil import spending in the long-term.[5] This impact can be estimated from either the amount of gasoline consumed or from the number of miles travelled.

(a) Fuel Consumed. In 1984, U.S. motor vehicles consumed 123.2 billion gallons of gasoline.[6] Assuming again that 42 gallons of gasoline is equivalent to one barrel of crude oil and that crude oil costs about $20 per barrel, this amounts to about $58.6 billion in total fuel spending. Assuming that the number of vehicle miles travelled stays constant, the reduction of CAFE from 27.5 mpg to 26.0 mpg would cause a 5.5 percent increase in fuel use over the long-term. This amounts to about 0.4 million bpd, nearly 20 percent of the Alaskan pipeline delivery rate. Also, the 5.5 percent fuel increase would raise spending by about $3.2 billion per year.

---

[3] Personal communication with Dave Hinton, DOE Energy Information Administration, May 18, 1987.

[4] U.S. Dept. of Energy. Energy Information Administration. Monthly Energy Review, (DOE/EIA-0035) Jan. 1987. Table 1-10, U.S. Passenger Car Efficiency. p. 15.

[5] Strictly speaking, CAFE applies to the average mpg of newly manufactured vehicles; it does not apply directly to the entire vehicle fleet on the road. However, if no further changes are made to CAFE standards, the Nation's vehicle fleet would eventually approach the existing 26.0 mpg standard instead of the previous 27.5 mpg level. Assuming that the 1987 level is about 19 mpg and that efficiency continues to improve at its current rate of 0.5 mpg per year, a 26.0 national efficiency level would be reached in the year 2001. Similarly, a 27.5 level would have been reached in the year 2004.

[6] U.S. Dept. of Energy. Oak Ridge National Laboratory. Transportation Energy Data Book: Edition 9, (ORNL-6325) Apr. 1987. Table 1.14. p. 1-24.

(b) Miles Travelled. In 1986, U.S. motor vehicles travelled about 2,400 billion miles.[7] Assuming national efficiency reached the former 27.5 mpg CAFE value, this amounts to about 5.7 million bpd. If crude oil costs $20 per barrel, national fuel spending would amount to $41.5 billion. Assuming a 26.0 mpg CAFE, about 6.0 million bpd would be used at an annual cost of about $44.0 billion. An estimate of the maximum fuel use increase is obtained from the difference between the values for the two CAFE levels. This yields an increase of about 0.3 million bpd--nearly 15 percent of the Alaskan pipeline delivery rate. Alternatively, assuming crude oil costs $20 per barrel, the difference in CAFE levels would mean about a $2.5 billion annual increase in spending.[8]

The disparity in the estimates from (a) and (b) is a result of the different assumptions about the efficiency of the Nation's motor vehicle fleet. Because the primary task is to produce a rough estimate of the greatest possible impact, it seems fair to say that rollback of CAFE could increase oil import spending by as much as $2 billion to $3 billion per year.

Conclusion

The size of the CAFE impact is roughly three to five times that projected for the speed limit, but a much longer period of time will elapse before its full effect is felt. The combined impact of the rollback in speed limit and CAFE could increase oil use by as much as 0.5 million bpd. Similarly, the combined impact on oil import spending could reach as high as $3 billion to $4 billion per year.

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[7] The source is the Federal Highway Administration, as reported by the Highway Users Federation. Highway Fact Book 1987. Table on Growth Trends in Vehicle Miles of Travel. p. 2.

[8] Again, the calculations assume that one barrel of oil is equivalent to 42 gallons of gasoline.

If we can be of any further assistance, please do not hesitate to call (287-7039).

FJS(MRS/RLC)kib

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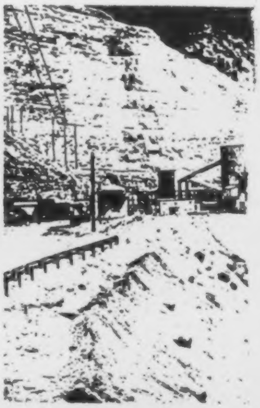
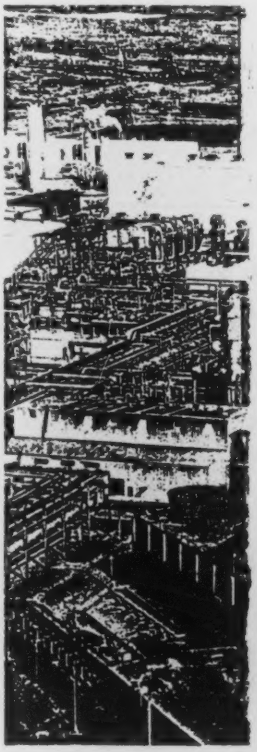
WHATEVER HAPPENED TO OUR ENERGY ALTERNATIVES?

Are we inviting another energy crunch? One cabinet member thinks so—and there's evidence he's right. Development of synfuels and renewable resources has faded.





By WILLIAM H. MILLER

The gasoline lines were growing longer, the interval between OPEC oil price hikes shorter. An exasperated President Jimmy Carter, clad in a cardigan, sat in front of a fireplace and made a television speech to the nation declaring "the moral equivalent of war" on the energy crisis. Later, he ordered that solar-collector panels be installed on the White House roof.

That was in the late 1970s. Today, Mr. Carter, his cardigan, and the energy crisis are gone from the White House.

So, too, are the solar collectors.

The panels were taken down last year in the midst of the pervasive oil glut—a glut that sent world oil prices, which had soared to $35 a barrel (bbl) as recently as 1981, plummeting to below $10. Just as the solar equipment symbolized the nation's determination to achieve "energy independence," its removal symbolized the disappearance of energy as a priority concern. It also was eloquent testimony to the nation's declining interest in developing alternative forms of energy.

From solar to synfuels, alternative energy sources lately have been getting a cold shoulder. And that is worrisome, for it has happened—or has been allowed to happen—despite ominous warnings of another energy crunch.

The alarm bells have grown louder as oil demand has continued to rise and domestic production has declined.

Already, the U. S. is relying on imports for more than 38% of its oil—higher than the level during the 1973 Arab embargo. By the 1990s this dependency will reach 50% or higher, predicts a 240-page study on U. S. energy security released in March by the Dept. of Energy (DOE).

A particularly grim prediction comes from Interior Secretary Donald Hodel, former Secretary of Energy. In mid-February he told a Congressional committee: "People will be sitting in gas lines again within the next two to five years."

SOLAR FADE-OUT. Against that backdrop the current status of energy alternatives is cause for dismay. And no alternative technology has fallen more in disfavor than solar power. In evidence of the decline, the Solar Energy Industries Assn. (SEIA), a Washington-based trade group, estimates that sales of once-faddish solar-water and space-heating systems likely will reach only $275 million this year. In 1985 nearly $1 billion worth were sold.

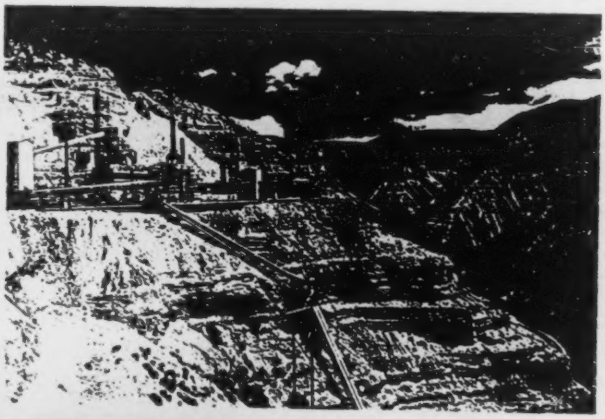
"This industry has been devastated," laments Scott Sklar, SEIA's government-relations director. "Two years ago, about 185 manufacturers were in the business. Now only about 20 are left. And they are struggling."

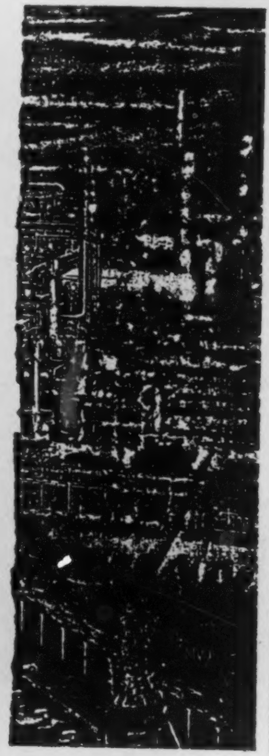
Among the strugglers is U. S. Solar Corp., Hampton, Fla. Even though its payroll has dropped from 75 to a mere eight employees, "we're better off than most companies," says its president, Steven Gorman. "We've been kept alive by our international sales."

Solar-equipment manufacturers have been bloodied by two crushing body blows. One was the elimination in December 1985 of the federal tax credit for residential solar-energy installations. The other, even more crippling, has been the collapse of oil prices.

CHANGING PERCEPTIONS

Last year's unprecedented price drop—sharper than almost anyone in the energy industry or any economist had foreseen—ravaged *all* alternative energy





Synfuel survivors. *The Great Plains coal-gasification project in North Dakota (left) and Unocal's oil-shale venture in Colorado (above) are in commercial production. The Dept. of Energy now runs the Great Plains facility.*

technologies. Other renewable forms of energy such as geothermal, wind power, hydropower, and biomass joined solar on the casualty list. An array of synthetic fuels also were rocked.

Even before last year's oil-price free fall, most of these technologies had been feeling the effects of the oil capacity glut. More to the point, they were hurt by changing perceptions of the direction of oil prices.

Until the glut, energy producers had been anticipating unrelenting increases in oil prices. Forecasts of $100/bbl oil by 1990 were not uncommon. Even though alternative technologies weren't economically compelling at the time, the thinking went, surely they would become so as oil grew even more expensive. But, as the glut increased, these expectations began to dim.

Synthetic fuels, in particular, were decimated by the price plunge. Work on them has slowed to a trickle as major oil companies, which had shouldered the bulk of synfuel investment, have been beset with severe cash-flow problems resulting from falling prices and their absorption of debt to fight takeover attempts. In the industry's ubiquitous restructuring, synfuel projects—money losers with little prospects of turning a profit for years to come—usually have been the first to be scuttled.

Public assistance has mostly dried up, too. Congress last year deep-sixed the Synthetic Fuels Corp. (SFC), the quasi-government firm approved in June 1980. It was staked with $15 billion to be doled out in subsidies to speed synfuel commercialization. In the end, though, the corporation backed only four projects, which now are being monitored by the Treasury Dept.

SHUTTING DOWN. Indeed, company after company has retreated from synfuels. The massive withdrawal began in 1982 when Exxon Corp. abandoned its behemoth $6 billion Colony Oil Shale Project near Parachute, Colo. Subsequently, other oil-shale ventures were shelved by Occidental Petroleum Corp., Tenneco Inc., Standard Oil Co., Phillips Petroleum Co., and Sun Co. Inc. A variety of coal-liquefaction projects also went by the board—notably ambitious undertakings sponsored by Standard Oil, Ashland Oil Inc., and Gulf Oil Corp.

"Many companies in the petroleum industry bent their swords on synfuels and have nothing to show for it. Any work they're doing now is very low-level," observes Bruce Peterson, deputy director of refining at the American Petroleum Institute. He once headed the association's synfuel unit, which, reflecting the industry's decline, was eliminated last year.

Another indicator of the synfuel industry's deterioration is the reduced presence of the Council on Alternate Fuels, a trade association of synfuel producers and their suppliers. The Washington-based group boasted 80 member companies in 1980; now it's down to 22. And because the term "synthetic fuels" has lost its luster, says President Michael Koleda, the council last year changed its name from the Council on Synthetic Fuels.

Executives in the energy industry see the trend as ominous. "We in the U. S. are negligent for not having continuity in our energy policy—for not having a theme to assure us of necessary energy for the future," declares Donald C. Vaughn, president of M. W. Kellogg Co., a Houston-based engineering and construction firm that builds refineries and other large energy facilities, including synfuels plants. Beyond filling the Strategic Petroleum Reserve, which now has reached 500 million bbls of its planned 750 million bbl capacity, "we've done little," he frets. "It could hurt us in the future."

BUDGET CUTS. Has the U. S. gone overboard in deemphasizing alternative energy technologies?

"That's a question that should be seriously addressed by government," asserts Mr. Koleda at the Council on Alternate Fuels. "Personally, I believe we are not doing enough. If OPEC plays it smart, it can make us vulnerable again."

Mr. Koleda acknowledges, however, that the level of government participation in spurring alternative energy is a political call. "You can make a legitimate argument that we *are* doing enough," he admits.

The Reagan Administration is making precisely that argument—despite deep slashes in its funding requests for civilian energy programs. President Reagan's fiscal-1988 budget request for solar and renewable energy programs in DOE is $107.5 million, down 38% from 1987's appropriation of $174.2 million. In fiscal 1985 the funding level was $240 million.

Meanwhile, the President is requesting $168.9 million for DOE's fossil energy R&D, a decrease of 43% from current levels. However, many of the programs under the wing of the Office of Fossil Energy "already are ready for the marketplace," explains John Siegel, DOE's deputy director for fossil energy.

Moreover, he points out that DOE is spending an additional $149 million specifically to develop technologies aimed at burning coal more cleanly. And Mr. Reagan is requesting a $50 million *increase* from that amount for fiscal 1988 to fund the second round of DOE's clean-coal technology demonstration program. He's also told Canada he will commit $2.5 billion over five years to seek less-expensive technologies for controlling acid rain—a step also aimed at cleaning up coal.

"We're much, much more ready now to meet an energy shortage than at any time in the past," Mr. Siegel asserts. "In the next five years we'll be even more ready."

Significantly, DOE's coal-technology program is driven by environmental concerns, especially the rising worry about acid rain. That's a change from the department's former thrust in the development of alternative technologies: reducing the nation's dependency on foreign crude oil.

INTO THE SUNSHINE

Present activity in alternative energy isn't confined to these relatively minuscule DOE programs. Much more is going on.

In the area of renewable energy, scientists are excited over progress in the development of photovoltaic cells, which produce electricity directly from sunlight. Their cost has come down dramatically since their introduction in the 1950s and has dropped from $20 to $8 per peak watt just since 1977, reports the Fund for Renewable Energy & the Environment. But many experts doubt that photovoltaics will ever replace conventional generating plants for the production of electricity. Despite the price improvement, large-scale solar arrays remain five to ten times as costly as conventional powerplants.

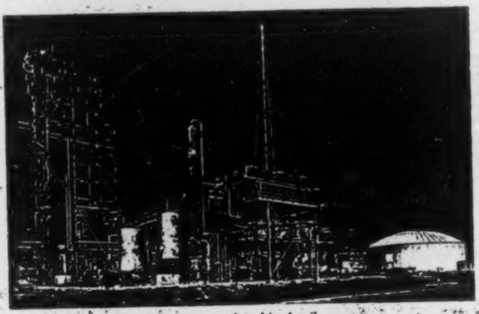
Still, the photovoltaic business is one sector of the solar industry that has a semblance of health. Seven cell manufacturers and some 35 small-scale solar packaging and distribution firms exist. Although few are profitable, they're finding growing markets for such specialized applications as powering streetlights and electric golf carts. Photovoltaic sales in the U. S. this year are expected to reach $350 million, up from $100 million five years ago, estimates SEIA.

"The photovoltaic industry is at the point where computers were 15 years ago," enthuses SEIA's Mr. Sklar.

SYNFUEL STATUS. Meanwhile, in the area of synthetic fuels, the four projects initially assisted by the now-defunct SFC are still alive.

The newest, the Forest Hill Heavy Oil Project

SYNFUEL PRICES: A QUESTION OF RELATIVITY



The Dow Syngas Project was completed in April.

The feasibility of synfuels is based on displacing oil at a certain cost. But when will oil prices be high enough to make the economics work out?

Not any time soon, apparently.

Observes Rep. Phil Sharp (D, Ind.): "Most of the synthetic-fuels options that the government tried to commercialize through the [now-defunct] Synthetic Fuels Corp. will be viable only at oil prices of $40 to $60 a bbl or more—and other supply-and-demand factors are likely to prevent the price from going that high for very long."

Dimmed expectations also are the rule among large oil companies, who've been the major synfuel players. Most CEOs in the industry—Unocal Corp. Chairman Fred Hartley, an oil-shale enthusiast, is a notable exception—estimate that the price of oil would have to be at least $40/bbl—and perhaps as high as $70—before alternative technologies could become economical.

Still, Ralph Bayrer, a former Synthetic Fuels Corp. official who now monitors the corporation's former projects for the Treasury Dept., points out: "There's no a priori oil price at which synfuels become economic." Costs come down as the learning curve advances and as larger-scale plants are built, he explains.

Another expert, I.C. Bupp, managing director of Cambridge Energy Research Associates, Cambridge, Mass., foresees synfuel technologies starting to become attractive at an oil price of $30 a bbl. At a price of $20, he says, "energy conservation gets increased attention."

It is energy conservation, contends Mr. Bupp, that is the U. S.'s ace in the hole. "It is by far the cheapest, most attractive, but least exploited source of new energy," he declares. Despite the dramatic gains made in energy conservation during the 1970s, he believes that "the surface has barely been scratched." Holding special promise for further gains, he says, are the areas of illumination and design of electric motors and home appliances.

Rep. Sharp: *Viable options?*

in Wood County, Tex., began commercial production in March. Sponsored by Greenwich Oil Corp., Dallas, it is receiving $60 million in price and loan guarantees to recover 1,750 bbls a day (b/d) of so-called heavy oil—considerably more viscous than conventional lighter crudes. The project's main feature is a unique underground, *in situ* process known as oxygen fireflooding.

A larger undertaking, Unocal Corp.'s widely publicized oil-shale project adjacent to Exxon's defunct Colony facility in Colorado, finally reached commercial production last December. The start-up came after two years of wrestling with the stubborn problem of cooling the retorted shale. Representing a capital investment of $650 million, the project is operating at half its planned 10,000 b/d capacity. It has a price guarantee of $45 a bbl that can rise with inflation. That price is about $28 higher than the current price of conventional crude—and high enough, it is believed, to enable the plant to operate profitably. (Unocal won't reveal its production cost.)

The other two SFC-bred projects—one sponsored by Dow Chemical Co., the other by a consortium led by Texaco Inc.—both utilize coal-gasification technology. And both are "combined-cycle" facilities that integrate a coal gasifier, a heat-recovery unit, and an electrical generating unit.

Texaco's project, the Cool Water Coal Gasification Project in the Mojave Desert near Barstow, Calif., has been gasifying 1,000 tons of coal a day to produce 70,000 cu ft (70 mcf) a day of medium-Btu gas since operations began in 1984. This gas is then converted to 111 mw of electricity—the energy equivalent of 4,300 b/d of oil. The venture is backed with federal price guarantees of $120 million.

Dow's facility, the Dow Syngas Project at the company's chemical complex in Plaquemine, La., was completed in April. Staked with $620 million in price guarantees, it is designed to produce 115 mcf of medium-Btu gas a day from 2,400 tons of coal. Its electricity output is slated to reach 160 mw, the equivalent of 5,200 b/d of oil.

PRIVATE FUNDING. Still another coal-gasification venture is the $2.1 billion Great Plains Project near Beulah, N. Dak., the nation's largest synfuel plant. It is currently run by DOE, which recently hired Shearson Lehman Brothers, a New York investment banker, to find a buyer.

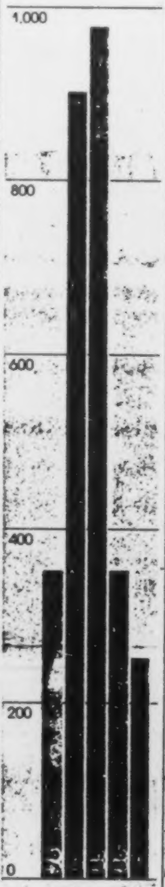
The project's original sponsors, chiefly Tenneco Inc. and American Natural Resources Co., pulled out in 1985 when their loan guarantees expired. But the facility is working well, processing 8,000 tons of lignite a day to produce 125 mcf of high-Btu gas—the equivalent of 21,000 b/d of oil.

THE METHANOL SOLUTION. As these projects suggest, coal gasification is where the synfuel action is now. Thanks to the beckoning utility sector, which likely will need to expand in the next decade to meet growing electrical demand, gas-from-coal is a technology that generally is considered the closest to commercial viability.

At the same time, though, there's growing interest in methanol—an alcohol fuel that can be produced from coal, natural gas, biomass, and other sources. Although companies like Eastman Kodak are interested in it as a chemical feedstock, methanol lately has been attracting new enthusiasm as a liquid fuel for transportation.

THE RISE AND FALL OF SOLAR HEATING

(Sales by U. S. manufacturers of water and space heating equipment; millions of dollars)



*Estimated
**Projected
Source
Solar Energy Industries Assn.

Chart by Annemarie Bonic

"The nation forgets that we don't face a shortage of energy. What we face is a shortage of oil," states Tom S. Runge, a staff member of the House Fossil & Synthetic Fuels Subcommittee. "We have plenty of basic energy—just not the right form." If the U. S. could develop an economical substitute for gasoline, which accounts for more than 40% of oil demand, it would be a giant step in reducing dependence on oil, he reasons. And methanol, he asserts, "is the single most promising gasoline substitute."

Currently, most methanol is produced from natural gas. But making it from coal may have even greater potential.

"There's a neat crossover between coal gasification and liquid transportation fuels," says the Council on Alternate Fuels' Mr. Koleda. "You can make gas out of coal, sell the steam from the process, sell electricity from it, and then add an element to liquefy it as methanol to sell to the vehicle market. You can argue that coal gasification solves the energy problem!"

'NOT IN THE CARDS.' But not everybody is that optimistic. Widespread doubt exists that alternative energy technologies will make economic sense before the 21st century.

For example, at an energy-policy forum staged last year by the Aspen Institute for Economic Studies, a prestigious group of energy experts from both the private and public sectors scarcely mentioned alternative energy as a factor in the U. S.'s energy future. Although the participants agreed that the threat of an oil shortage is real, they produced a relatively mild set of recommendations aimed mainly at stimulating oil exploration and development.

"There was little enthusiasm for alternative energy," reports Eric Zausner, a former federal energy official who chaired the forum. Now a managing partner at Booz, Allen & Hamilton Inc., consultants, he observes that "the cost of alternative fuels is still above the range of price expectations." Specifically, he believes that synfuel technologies—even coal conversion—"aren't in the cards."

For its part, DOE pins great hopes on enhanced oil recovery—coaxing more oil out of existing fields.

Then, too, there's nuclear power, a technology that despite its current ills still produces 16% of the U. S.'s electricity. "Nuclear is a [potentially] cheap source of energy. It'll revive in the 21st century," predicts Stanford Field, director of energy programs at SRI International, a Menlo Park, Calif., research firm. "By then, the public will perceive it as safe."

The trouble is, it takes years to build a nuclear powerplant. And energy conservation can't be turned on overnight.

Unfortunately, Congress and the public will seek overnight action when the next energy crisis hits—just as they did last time. The question remains: Has the nation cut back too far in developing alternative energy?

The next crisis will provide the answer. ■

Chart by Annemarie Bonic

Order Code IB83003

CONSERVING ENERGY: THE REAGAN BUDGET AND THE FUTURE FEDERAL ROLE

(ARCHIVED--12/18/85)

UPDATED 12/12/85

BY

Gary J. Pagliano

Environment and Natural Resources Policy Division

Congressional Research Service

ISSUE DEFINITION

During the period 1974-1980, Congress, prompted by much higher energy prices, scarce oil supplies and greater U.S. dependence on foreign oil, passed a series of energy conservation measures. These were designed first to convince U.S. consumers that they should practice energy conservation and second to show them the best ways to conserve. The measures included information transfer programs, economic incentives, some regulation, and substantial research and development (R&D). These measures, along with higher oil prices resulted in impressive energy savings in the United States.

The important question for Congress has been to determine the effect the Federal energy conservation programs had on the energy savings in the United States, while it reviewed the Reagan Administration's proposal for funding reductions in many Federal conservation programs. Congress ended up restoring funds in the first four Administration budget proposals, although the Administration did request a larger (than in the past) conservation budget for FY85. This year, the 99th Congress must evaluate the Administration's FY86 proposal to cut the conservation budget by 20%. In the process, Congress will have to address the question: what should be the future Federal role in energy conservation?

BACKGROUND AND POLICY ANALYSIS

Four major bills provide the legislative base upon which the Federal conservation program was built. They were enacted during the 94th through the 96th Congresses: the Energy Policy and Conservation Act (P.L. 94-163), Energy Conservation and Production Act (P.L. 94-385), National Energy Conservation Act (P.L. 95-619), and the Energy Security Act (P.L. 96-294). Most of the programs were voluntary in nature and were placed in the Department of Energy (DOE) for implementation. A notable exception was the Solar Energy and Energy Conservation Bank, which was administered by the Department of Housing and Urban Development.

The Energy Conservation Budget

During the first 4 years, the Reagan Administration emphasized an energy supply-side policy in conventional fuel development and as a result proposed significant reductions in the Federal role for conservation and solar energy. With the decontrol of oil, it was felt that many Federal conservation and solar programs were unnecessary; higher energy prices would be sufficient incentive to promote conservation and solar energy commercialization. Total projected reductions in the conservation budget were to total $2.4 billion by the end of FY86. This represented program outlay reductions of about 30% in FY81, 80% in FY82, and over 90% in FY83.

Congress refused to go along with these reductions for FY82, restoring a good portion of the funding that was cut. The same process took place for FY83; The Administration's request of only $21.8 million for energy conservation program was increased to $367 million. The FY84 budget request of $74 million was increased to $430.5 million. The steady congressional insistence on continued significant funding had its effect for FY85; the

Administration requested a total of $400.2 million.

However, the Administration for FY86 proposed a 20% reduction in all conservation programs. The House has responded by restoring $101.6 million to DOE's conservation budget in passing H.R. 3011 on Aug. 1, 1985. The tables that follow describe the history and current status of energy conservation funding.

Table 1

Administration's Budget Requests and Congressional Enactments
Summary of Estimates by Appropriation by Major Category
Energy Conservation
(in millions of dollars)

	FY81 Actual	FY82 Actual	FY83 Enact.
Research and Development			
Buildings and Community Systems	91.3	47.7	39.1
Industrial	69.6	28.8	27.9
Transportation	105.1	58.9	53.9
Multi-Sector	26.5	16.4	12.7
Subtotal	291.5	151.9	133.6
Grant Programs			
State and Local	402.3	231.9	233.7
Subtotal, Energy Conservation	709.3	383.8	367.3
Total, Energy Conservation	709.3	143.0	279.3

Table 2

	FY84 App.	FY85 Admin. Request	FY85 App.	Admin FY86 Req.	House FY86 Bill	Sen. App. Comm. FY86 Bill
Research and Development						
Buildings and Community Systems	36.8	35.3	41.3	37.3	40.5	36.2
Industrial	33.7	33.3	32.0	35.5	45.0	35.6
Transportation	65.0	51.1	61.8	43.0	60.7	68.6
Multi-Sector	12.8	26.5	23.3	26.7	27.7	27.2
Subtotal	148.3	146.2	158.4	142.5	173.9	167.6
Grant Programs						
State and Local	280.2	252.2	283.1	225.6	283.4	278.0
Policy and management	2.0	1.8	--	2.6	1.3	1.3
Other	--	--	17.7	-4.0	9.7	-10.3
Total, Energy Conservation	430.5	400.2	459.2	366.7	468.3	436.6

1/ Committee-recommended funding was reduced by 3% across the board on the House floor.

* The requested FY86 levels are contingent upon enactment of legislation to utilize monies recovered by the U.S. Government from petroleum pricing and allocation violations under the Emergency Petroleum Allocation Act of 1973, as amended. If receipts from this source are insufficient to match the appropriation, the balance will be derived from the general fund.

Research and Development -- Building and Community Systems

The purpose of the Buildings and Community Systems program was to both increase the rate of improvement in energy efficiency in the Nation's inventory of buildings and to develop and implement techniques and incentives for more efficient use of energy in community systems and consumer products.

The early Reagan proposals terminated such programs as the Residential Conservation Service (RCS) and the community technology and urban waste programs (see Table 2, below), but the FY86 proposal continues funding of all but the urban waste program.

Table 3
Building and Community Systems
($ in millions)

	FY83 Enact.	FY84 Approp.	FY85 Approp.	FY86 Req.	House FY86 Bill
Building Systems					
Buildings	$13.4	13.9	14.9	12.9	13.3
Residential Conservation Svc.	3.4	0.5	1.3	0.4	.4
Community Systems					
Community Tech.	3.7	4.2	5.4	2.0	4.0
Urban Waste	3.0	1.5	1.0	0.0	0.0
Consumer Products					
Tech. and Products	10.6	10.0	10.0	9.4	11.3
Appliance Standards	1.0	1.7	2.5	2.0	2.0
Federal Programs					
Analysis and Tech. Transfer	1.0	.2	1.0	3.4	2.8
Federal Energy Mgt.	.0	1.0	1.3	1.5	1.3
Policy Analysis and Program Direction	2.5	2.9	2.9	3.5	3.2
Capital Equipment	0.0	1.5	1.2	2.2	2.2
SUBTOTALS	$39.0	$41.3	$41.3	$37.3	$40.5

The RCS requires electric and gas utilities to perform "energy audits" for its customers if asked. While the residential portion of the program terminated on Jan. 1, 1985, the RCS FY86 appropriation line item has funding for the Department of Energy to begin implementing the Commercial and Apartment Conservation Service (CACS), which is a conservation service for business properties. However, the CACS remains problematical. DOE favors the repeal of CACS. The 98th Congress came close to repealing the program when the House passed such a provision, but the Senate postponed beginning action on the bill until late October and then time expired. As a result, CACS legislation is still in force, and utilities as well as States are faced with having to budget funds for the program, even though the same repeal language has again come before the 99th Congress (in H.R. 969). On July 29, 1985, the Senate passed S. 410, which would repeal the CACS program.

Industrial

Virtually all of DOE's industrial conservation programs were reduced in the FY83 and FY84 Reagan budgets (see Table 4), but the FY85 request was very close to the level set by Congress for FY84. And for FY86, the request shows an increase over the previous year.

Table 4
Industrial Conservation
($ in millions)

	FY83	FY84 Approp.	FY85 Approp.	FY86 Request	House FY86 Bill
Waste energy reduction	$12.0	11.8	11.9	12.3	11.8
Process efficiency	7.7	14.2	9.6	13.5	23.5
Cogeneration	5.0	4.0	4.1	4.7	4.7
Implementation and commercialization	1.7	1.9	2.5	3.2	3.2
Policy Analysis and program direction	1.5	1.6	1.8	1.8	1.8
Capital Equipment	--	0	2.2	0	--
SUBTOTALS	27.9	33.7	32.1	35.5	45.0

Congress strongly believed that, for the most part, the industrial conservation projects undertaken under Federal leadership were highly effective and stimulated the infusion of energy conservation technologies into the marketplace. In particular, ongoing thrusts in advanced heat pumps, cogeneration systems, utilization of waste materials, and heat exchangers have been extremely effective in improving energy conservation as well as productivity. Of special note is the House recommendation of an extra $10 million for process efficiency research in the steel industry. The industry with DOE national labs and some univesities is to develop technologies that will allow major gains in productivity.

Transportation

When the Office of Transportation Programs was created, it had two overriding objectives: (1) to reduce energy consumption within the transportation sector; and (2) to reduce that sector's dependence upon petroleum. The Reagan Administration reduced budget authority for this office; the House, however, restores most of the funding authority.

Table 4 summarizes the budget history.

Table 5
Transportation Conservation
($ in millions)

	FY83 Approp.	FY84 Approp.	FY85 Approp.	FY86 Request	House FY86 Bill
Vehicle propulsion technology Research and development	$35.0	38.0	31.9	20.1	34.4
Electric and hybrid vehicle program	13.9	11.6	8.4	6.1	9.4
Transportation utilization programs	0.0	0.5	1.7	1.2	1.2
Alternative fuels utilization	1.5	2.5	2.5	1.6	1.6
Advanced materials development	2.0	1.5	6.1	9.3	9.3
High Temperature Materials lab	--	--	6.5	3.0	3.0
Policy Analysis and Program direction	1.5	1.9	1.9	1.7	1.7
Capital Equipment	0.0	0.0	2.9	0.0	0.0
Construction	0.0	9.0	6.5	2.7	--
Subtotals	53.9	65.0	61.2	43.0	60.1

Multi-sector

Conservation multi-sector activities can be grouped into two major program areas. One concentrates on encouraging individuals and small businesses to develop and demonstrate small-scale, energy-related technologies which match local and community energy resources and requirements. It also provided support to small businesses and individuals for the development of energy-related inventions. Although most of these individual projects were small, they were to show promise of achieving substantial energy savings and very high benefit-cost ratios for the Federal investment involved.

The other major activity area is concerned with applied basic research and exploratory development on advanced energy conversion technologies. Projects could be transferred to the transportation, industry, and buildings and community systems programs for engineering development and demonstration if technical and economic feasibility has been established.

Table 6
Multisector Conservation
($ in millions)

	FY83 Enact.	FY84 Approp.	FY85 Approp.	FY86 Req.	House FY86 Bill
National Appropriate Technology Information System	$ 1.5	0.5	1.5	1.0	1.5
Inventor's Program	2.0	3.0	4.9	5.0	5.0
Energy Conversion Technology	9.0	9.0	17.3	20.2	19.7
Program Direction	0.2	0.3	0.3	0.5	.5
Capital Equipment	0.0	0.0	1.7	1.0	1.0
SUBTOTALS	12.7	12.8	23.9	26.7	27.7

Grant Programs

The objective of this program is to channel Federal funds to State and local governments to undertake conservation measures. These grant activities include:

energy conservation retrofitting measures in school and hospital buildings;
weatherization assistance to low-income persons, particularly elderly and handicapped persons, who live in older, less energy-efficient housing; and
assisting States in developing and administering State energy conservation programs.

Table 7
Conservation: Grant Programs
($ in millions)

	FY83 Enact.	FY84 Approp.	FY85 Approp.	FY86 Request	House FY86 Bill
STATE AND LOCAL					
Schools and Hospital Grants	48.0	48.0	47.0	37.6*	47.1*
Weatherization	145.0	190.0	191.0	152.9*	200.0*
Energy Policy and Conservation	24.0	24.0	23.5	18.8	18.8
Territories Assistance	--	--	--	--	1.5
Energy Extension Service	10.0	10.0	9.8	7.8	7.8
Program Direction	6.7	8.2	9.7	8.4	8.1
SUBTOTALS	233.7	280.2	283.1	225.6*	283.4*

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* The requested FY86 levels are contingent upon enactment of legislation to utilize monies recovered by the U.S. Government from petroleum pricing and allocation violations under the Emergency Petroleum Allocation Act of 1973, as amended. If receipts from this source are insufficient to match the appropriation, the balance will be derived from the general fund.

The Reagan Administration FY84 request of $3.3 million for Conservation grant programs called for terminating the way in which the Department provides Federal funds to State and local governments. The Administration believed budget reductions were justified because energy costs and substantial Federal tax credits have motivated individuals, businesses, and other institutions to undertake major conservation efforts. Because of current public awareness of energy conservation benefits and the high level of private investment in energy conservation, they also believed that grants for State energy offices and public outreach programs did not warrant Federal support.

The 97th Congress reinstated all but one of the programs in FY83 when the Administration first tried to terminate them. Congress emphasized that the weatherization program should continue to make grants according to rules in effect on Oct. 1, 1982, and not be any more restrictive, as had been planned by DOE.

The 98th Congress proceeded in the same direction. Indeed, the House passed the Weatherization and Employment Act of 1983, which would have extended the current weatherization program another 10 years. The Senate failed to take action on the bill; however, it did agree to expand the limits of coverage in the current weatherization program (P.L. 98-558). This law

-- amends the Energy Conservation in Existing Buildings Act of 1976 ("the Act," for purposes of this title) to allow a State to elect an income eligibility level for purposes of the Act which is the same as the basis for eligibility for assistance under the Low-Income Home Energy Assistance Act fo

1981, provided that such basis is at least 125% of the poverty level determined in accordance with criteria established by the Director of the Office of Management and Budget;

-- includes as "weatherization materials" for purposes of the Act furnace efficiency modifications, including (but not limited to): (1) replacement burners, furnaces, boilers, or any combination thereof; (2) devices for minimizing energy loss through heating system, chimney, or venting devices; and (3) electrical or mechanical furnace ignition systems which replace standing gas pilot lights;

-- limits the average expenditure, per dwelling unit, of labor, weatherization materials, and related materials provided as weatherization assistance for all dwelling units in a State to $1,600. (Under current law, a maximum of $800 may be spent on weatherization materials and related matters for any dwelling unit, except that the Secretary of Energy may increase such limitation to $1,600 where necessary to pay labor costs.);

-- provides that dwelling units partially weatherized under the Act or under other Federal programs during the period Sept. 30, 1975, through Sept. 30, 1979, may receive further financial assistance for weatherization under the Act; and

-- requires the Secretary of Energy, beginning in FY86, to allot at least 5% and not more than 15% of the amounts authorized for each fiscal year to a performance fund which shall provide financial assistance to those States which have demonstrated the best performance during the previous fiscal year in providing weatherization assistance.

The Future Federal Role

Traditionally, a main issue when the role of government changes is the degree to which it should change. The Reagan Administration first proposed a dramatic change in the Federal energy conservation role -- reducing it from extensive involvement in technology development, regulation and information, and financial assistance to State and local governments to only slight involvement in R&D. It was readily apparent that the "free market" philosophy dominated the Administration's thinking in developing this new role. Congress reacted by reinstating the funding for many of the programs by the Administration, particularly during fiscal years 1981-1984.

Congress, in evaluating the proposed Reagan budgets and the resulting program reductions, considered a number of factors. One such factor was program effectiveness. A measure of program effectiveness is comparing benefits from a program to its costs. As a rule, the greater the public benefit per dollar invested in a Federal program, the greater the tendency should be to keep the program.

Another factor was whether or not important objectives of U.S. energy policy remained intact. One such objective was to reduce dependence on foreign oil imports. As previously stated, Congress became convinced that an ongoing government conservation program in cooperation with the various sectors of the economy was the best assurance of short-term success at reducing the Nation's dependence on imported oil and, in the long term, of reducing the rate of depletion of domestic resources.

And, lastly, there was the equity factor which might take into account the negative consequences of a particular policy. For example, while higher energy prices stimulated energy supply development and energy conservation, they adversely impacted low-income and low-moderate income energy consumers. Under past Reagan budgets, programs specifically designed to help these groups conserve were eliminated, as in the case of the Solar Energy and Energy Conservation Bank, and the low-income weatherization program. Without economic help to conserve (tax credits of course are meaningless to this group), low-income and low-moderate income consumers would probably continue to pay a significant share of their income for energy.

The Administration's position on energy conservation has changed somewhat during the last year. The Administration's latest National Energy Plan added emphasis to conservation as part of its policy, calling it "a significantly important energy source." However, this new emphasis was somewhat contrary to the proposed reduction in the conservation budget for FY86. In an era of declining world oil prices, the potential for the United States to abandon conservation measures because of market forces makes it most important that the future Federal role be constantly reevaluated.

LEGISLATION

H.R. 969 (Hall)

Repeals the program providing for residential energy conservation plans for public utilities and home heating suppliers and the energy conservation program for commercial buildings and multifamily dwellings under the National Energy Conservation Policy Act. Introduced Feb. 6, 1985; referred to Committee on Energy and Commerce.

H.R. 3011 (Yates)

Title II: Related Agencies. Makes appropriations for the Department of Energy for the clean coal technology reserve, fossil energy research and development, naval petroleum and oil shale reserves, energy conservation, economic regulation, emergency preparedness, the Energy Information Administration, and the SPR (Strategic Petroleum Reserve) Petroleum Account. Earmarks funds for the functions of the Office of the Federal Inspector for the Alaska Natural Gas Transportation System.

S. 410 (Johnston)

Repeals provisions of the National Energy Conservation Policy Act which require electric and gas utilities to offer comprehensive site-specific audit services to those customers who are owners of multifamily dwellings and commercial buildings. Introduced Feb. 6, 1985; referred to Committee on Energy and Natural Resources. Passed the full Senate on July 29, 1985.

HEARINGS

U.S. Congress. House. Committee on Appropriations. Department of the Interior And Related Agencies Appropriations for 1986. Hearings, 99th Congress, 1st session. Washington, U.S. Govt. Print. Off., 1985. 1057 p.

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Fiscal Year 1986 Department of Energy Authorization (Conservation and Renewable Energy). Hearings, 99th Congress, 1st session. Vol. III. Washington, U.S. Govt. Print. Off., 1985. 786 p.

U.S. Congress. Senate. Committee on Appropriations. Department Of the Interior and Related Agencies Appropriations for 1996. Hearings, 99th Congress 1st session. Part 1. Washington, U.S. Govt. Print. Off., 1985. 1016 p.

REPORTS AND CONGRESSIONAL DOCUMENTS

U.S. Department of Energy. Residential Conservation Service evaluation report. January 1984. Washington, D.C. (DOE/CE-0036)

U.S. General Accounting Office. Low-income weatherization -- better way of meeting needs in view of limited funds. Washington, U.S. Govt. Print. Off., 1985. 38 p. (GAO/RCED-86-194)

U.S. Library of Congress. Congressional Research Service. Residential conservation: how far have we progressed and how much farther can we go? Prepared for and printed by the House Committee on Energy and Commerce. January 1984. Washington, U.S. Govt. Print. Off., 1984. 121 p.

CHRONOLOGY OF EVENTS

12/04/85 -- Full Senate adopted motion to table H.R. 3011.

09/19/85 -- Senate Committee on Appropriations approved H.R. 3011, restoring $69.9 million to DOE's conservation budget authority.

08/01/85 -- The House passed H.R. 3011, restoring $101.6 million to DOE's conservation budget authority.

02/00/85 -- The Reagan Administration submitted to the Congress a budget which reduced by 20% new Federal spending for energy conservation programs.

10/30/84 -- S. 2565 was signed into law (P.L. 98-558) expanding the limits of coverage in the current weatherization program.

10/12/84 -- H.J.Res. 648 was signed into law (P.L. 98-473) providing 1985 funding levels for the Federal conservation program.

11/04/83 -- H.R. 3363 was signed into law (P.L. 98-146).

09/30/83 -- Conference report filed in House: $97 million reduction from House-passed conservation funding.

09/21/83 -- H.R. 3363 passed Senate.

06/28/83 -- The House passed H.R. 3363 which would maintain or expand funding levels for Federal energy conservation programs.

01/25/83 -- The Reagan Administration submitted to the Congress a budget which drastically reduced new Federal spending for energy conservation programs.

12/30/82 -- H.R. 7356 was signed into law, P.L. 97-394, funding Federal energy conservation programs.

09/30/82 -- The Congress passed a continuing budget resolution which freezes energy conservation spending at FY82 levels until Dec. 15, 1982.

02/08/82 -- The Reagan Administration submitted to the Congress a budget which terminates virtually all new spending (budget authority) for energy conservation programs.

07/31/81 -- The Congress passed the reconciliation bill, increasing DOE's authorization level for energy conservation to $570 million.

06/30/80 -- The Energy Security Act (P.L. 96-294) was signed into law, creating an Energy Conservation Bank and further expanding conservation programs in the residential sector.

11/09/78 -- The Energy Tax Act (P.L. 95-618) and the National Energy Conservation Policy Act (P.L. 85-619) were signed into law, creating incentives for conserving energy in residential and commercial buildings.

04/20/77 -- President Carter announced a national energy plan that included insulation and solar energy tax credits, increased funding for low-income weatherization, and mandatory conservation standards for home appliances.

08/14/76 -- The Energy Conservation and Production Act was signed into P.L. 94-385 providing for conservation standards for new buildings, insulation of low-income family housing, more rapid development of state energy conservation plans, initiation of a major new demonstration program to finance conservation and renewable resource measures in existing homes, and a $2 billion program of loan quarantees for conservation and renewable resource measures in commercial public buildings and industrial plants.

12/22/75 -- The Energy Policy and Conservation Act was signed into P.L. 94-163 providing for voluntary energy efficiency standards for major appliances and for Federal and State conservation plans.

03/01/75 -- Congressional Democratic Leadership proposed Economy and Energy Program; program goals include establishment of building standards and financial incentives for improvement of existing structures.

01/15/75 -- President Ford, in his State of the Union message, requested legislation for: (1) a national mandatory thermal efficiency standard for new residential and commercial buildings; (2) a 15% tax credit to homeowners for thermal efficiency improvements; and (3) subsidies to low-income and elderly homeowners for thermal efficiency improvements.

ADDITIONAL REFERENCE SOURCES

Oak Ridge National Laboratory. Evaluation of the BPA Weatherization Program. June 1985. 115 p.

----- Use of electricity billing data to determine household energy use "Fingerprints." August 1984. 41 p.

----- Selection of States for evaluation of the Residential Conservation Service. November 1983. 61 p.

----- Methods to deal with self-selection in estimating conservation program energy savings: Use of synthetic data to test alternative approaches. March 1983. 49 p.

Issue Brief

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AUTOMOBILE FUEL ECONOMY STANDARDS: ROLL BACK OR STATUS QUO?

UPDATED 01/23/87

BY

Robert Bamberger
Environment and Natural Resources Policy Division
Congressional Research Service

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ISSUE DEFINITION

One of the least controversial provisions of the Energy Policy and Conservation Act (EPCA) of 1975 (P.L. 94-163) was its establishment of average fleet fuel economy standards for passenger cars of both foreign and domestic auto producers. From the vantage point of the late 1970s and early 1980s, there appeared little prospect that manufacturers would have any difficulty in meeting the standard of 27.5 miles-per-gallon for model year 1985 and subsequent model years. However, when it became apparent that General Motors and Ford would be unable to meet the requirements of the statute, the two manufacturers petitioned the National Highway Traffic Safety Administration (NHTSA) for relaxation of the standard to 26.0 mpg. In October 1985, NHTSA granted a one-year reduction to 26.0 mpg for MY86. Then, in mid-January 1986, the agency invited comment on the appropriate level for the standard for model years 1986 and 1987, designating a range between 26.0-27.5 mpg. In early October 1986, the agency announced that the standard would remain at 26.0 mpg for MYs 1986-87. This issue brief reviews the history of the fuel standards, the provisions of EPCA, and the GM and Ford petitions.

BACKGROUND AND POLICY ANALYSIS

Although there was some awareness of national energy vulnerability before the Arab embargo of 1973-74, this embargo drove home the sensitivity of price and supply to even modest interruptions in supply. It also brought sharp focus upon U.S. oil consumption by the transportation sector where passenger automobiles alone accounted for 31% of total U.S. petroleum consumption. At the same time, new car fleet fuel economy was measured to have declined from 14.8 miles per gallon (mpg) in 1967 to 12.9 in model year 1974. Thus, there was every prospect that fuel consumption by automobiles was likely to grow and make the Nation increasingly dependent upon imported oil.

Recognition of the potential for oil conservation within the transportation sector also preceded the embargo. In the fall of 1972, the Environmental Protection Agency (EPA) published fuel economy data generated from vehicle emissions tests. The following spring, President Nixon called for a voluntary fuel economy labeling program for autos, and in early 1974, manufacturers accounting for the majority of sales in the Unites States agreed to participate in a voluntary program calling for a 40% fuel economy improvement over 1974 levels by 1980. Subsequently, the Federal Trade Commission confirmed the EPA emissions test procedure as the official measure for fuel economy for advertisement. The Energy Policy and Conservation Act (P.L. 94-163), enacted in late 1975, made the publication of the fuel economy guide and the posting of fuel economy ratings on new vehicles mandatory.

EPCA also established new car fleet fuel economy standards for passenger cars for model years 1978-80 and 1985. The Secretary of Transportation was authorized to establish interim standards for model years 1981-84, which were announced in June of 1977. The original standards were:

Model Year	Passenger Cars
1978	18.0
1979	19.0

1980	20.0
1981	22.0
1982	24.0
1983	26.0
1984	27.0
1985 and thereafter	27.5

Source: National Highway Traffic Safety Administration, Automotive Fuel Economy Program. Ninth Annual Report to the Congress. January 1985.

The attraction of consumers to fuel efficiency and smaller cars waned considerably when gasoline prices declined in real terms during the latter half of the 1970s. But sales of smaller cars rose sharply when the curtailment of petroleum exports from Iran in 1979 incurred a new shortage and drove crude oil prices up sharply. Demand for fuel-efficient cars overwhelmed American manufacturers, then unable to meet all the demand for smaller cars. All the major manufacturers predicted during 1980 that the 1985 fleets would significantly exceed the mandated 27.5 mpg standard. It was anticipated that consumer demand would compel improvements in the fuel economy of the passenger automobile fleet and render the fuel economy standards virtually irrelevant. The value of the standards appeared to be that they had compelled the manufacturers to plan for higher fuel economy, so that when external circumstances influenced consumer demand the domestic car industry was in a better position to meet it than they might have been otherwise.

But the current energy picture has brightened considerably. Recession and the introduction of conservation technologies have reduced world petroleum demand. Demand for OPEC production declined and prices softened. The attraction for the fuel-efficient and small cars turned uncertain. Total fleet fuel economy met the standards through MY82, but slipped thereafter.

Model Year	Federal Standard	Domestic Fleet	Import Fleet	Total Fleet
1978	18.0	18.7	27.3	19.9
1979	19.0	19.3	26.1	20.3
1980	20.0	21.9	28.6	23.5
1981	22.0	23.5	30.4	25.1
1982	24.0	24.5	30.7	26.1
1983	26.0	24.2	31.6	25.9
1984	27.0	25.3	31.2	26.5

Source: U.S. Department of Transportation. National Highway and Traffic Safety Administration. Automotive Fuel Economy Program; Seventh, Eighth, and Ninth Annual Reports to Congress. January 1983, 1984 and 1985.

Under EPCA, failure to meet the standards in any given model year subjected a manufacturer to a civil penalty of $5 for each one-tenth of a mile per gallon the corporate new car fleet fell short of meeting the standard -- multiplied by the number of vehicles in that fleet. However, failing to meet the standard in any single model year does not necessarily mean that a manufacturer will be found in noncompliance or liable for penalties. Under EPCA, as enacted, the penalties could be offset if the fleet exceeded the standards in the model year immediately preceding or following the year of the violation. The manufacturers would still have been deemed in violation of the law, but the credits would be subtracted from the civil penalty.

The Automobile Fuel Efficiency Act of 1980 (P.L. 96-425) extended the "carry forward" and "carry back" privilege to 3 years. It also redefined "unlawful conduct" by providing that noncompliance with the standard would not be a violation of the law if there were sufficient credits to offset it. If a manufacturer expected to be in noncompliance in a given model year and had not accrued offsetting credits in previous model years, it might be granted relief by demonstrating that its fleet would earn sufficient credits during the next three model years. Thus, if a manufacturer's new car fleet fuel economy were, for example, to fall short in MY85, the manufacturer could apply credits earned in the three previous model years, or -- based upon projections of sales and models for the next three model years -- argue that it would accrue sufficient credits to offset the penalty in MY85. Ford borrowed anticipated credits from MY86 to achieve compliance for MY84. General Motors anticipates the need to use both carry-back and carry-forward credits to meet the 27.0 mpg standard on 1984 vehicles, and will depend upon credits earned in future model years to offset its deficiency for model year 1985. Despite the application of carry-forward and carry-back credits, it is believed likely that General Motors, Ford and some foreign car manufacturers may face combined civil penalties in excess of several hundred million dollars.

The GM and Ford Petitions

In early March 1985, both Ford and General Motors filed petitions requesting that the standards be lowered: GM requested that the standard be lowered to 26.0 mpg for model years 1986 and thereafter; Ford requested a lowering of the standard to 26.0 mpg for model years 1986-89.

As of late 1984, it was not apparent that GM and Ford would petition for a relaxation of the standards. Pending then was a rulemaking governing adjustment factors to Ford and GM corporate average fuel economies (CAFE) to reflect changes instituted in the fuel economy testing procedures since 1975. Under EPCA, the fuel economy tests procedures must yield "comparable results" to the test procedures utilized for model year 1975. In 1979, Ford and GM petitioned EPA to adjust the measured fuel economy of their fleets to adjust for changes in the procedures which the manufacturers argued had had the effect of making the standards more stringent. EPA rejected the petition, but the matter was challenged in the courts, and the agency was ordered to initiate a rulemaking to establish procedures for establishing adjustment factors. A notice of proposed rulemaking in December 1983 proposed an industry-wide CAFE adjustment of 0.2 mpg for MY80 and subsequent model years. GM and Ford had argued that adjustments should be made on a manufacturer-specific basis. However, the prospect of gaining the 0.2 mpg adjustment, as well as the prospect that the rule-making procedure might support future additional adjustments, probably left open some hope among the vulnerable manufacturers that compliance might be achievable without petitioning for a change in the standards.

That hope was dashed when, in early 1985, the Administration decided not to seek extension of the Voluntary Restraint Agreement governing levels of Japanese imports brought into the United States. The quota imposed by the Japanese Government for the year beginning Apr. 1, 1985, was raised to 2.3 million vehicles, up significantly from the 1.85 million level for the prior calendar year period. Ford contended that it was unlikely that it could substantially increase the small car share of its sales in the face of that much additional Japanese competition.

EPCA provides that the Secretary of Transportation may amend the CAFE standard to "a level which he determines is the maximum feasible average fuel economy level for such model year." An adjustment of the standard between 27.5 mpg and 26 mpg does not require congressional review. If the Secretary exceeds those limits, the statute makes the decision subject to a one-House veto by Congress. However, such provisions were declared unconstitutional by the Supreme Court in its review of INS v. Chadha in June 1983.

The Secretary determines "maximum feasible fuel economy" in light of four considerations: (1) technological feasibility; (2) economic practicability; (3) the effect of other Federal motor vehicle standards on fuel economy; and (4) the need of the Nation to conserve energy. Ford and GM cited a number of arguments in common for lowering of the standards. Some of the major arguments advanced to support a relaxation of the CAFE standard to 26.0 mpg were that:

(1) The 27.5 mpg level for 1985 was a "target" set by Congress in 1975, and that Congress, recognizing the potential need for some downward adjustment of the standard, clearly delegated that authority to the Secretary.

(2) The market forces -- perceptions of oil scarcity and higher prices, which prompted consumers to be more conscious of fuel economy, had evaporated. Automobile purchases are characterized by a mix of considerations, including safety, comfort, purpose of use, and fuel economy. Elevating any one of these factors out of proportion is unwarranted.

(3) The standards were intended to help assure that the domestic industry would not suffer economically from an inability to meet a demand for more fuel-efficient cars. Similarly, it was not intended to see the industry comparably penalized if the standards could not be met. Any set of circumstances which compromises the economic health of the industry is undesirable.

(4) The possibility that GM and Ford may have to curtail production of larger, less efficient cars in order to be in compliance would result in the loss of jobs.

(5) Today's larger cars are far more fuel-efficient than their predecessors, but because of the sales mix, average fuel economy is not increasing at previous rates. GM argues in its petition that "manufacturers might produce the most technologically advanced fuel-efficient fleet of vehicles in history, yet fail to meet CAFE standards because of sales mix within that fleet." Amending the standards would not negate the technological progress that has been made or discourage further advances.

(6) The difference in oil consumption between a 27.5 mpg

> and 26.0 standard is minimal. The conservation benefits that would accrue from the higher standard are minimal contrasted to the potentially harmful economic consequences which are likely to result.

Chrysler opposed the petition and included the following rejoinders in support of its position:

(1) Chrysler cited its own success in meeting the standards as the best argument that it is unnecessary to adjust the standards. Ford and GM contended that Chrysler has met the standards by largely abandoning the larger-car market to them, but Chrysler said the explanation was that Chrysler invested in technology and weight reduction while its competitors did not. Indeed, Chrysler charged that GM and Ford made a very conscious decision to maximize profits.

(2) Chrysler argued that it was inappropriate to adjust the 1986 standard at this time because it would be too late for Chrysler to adjust its vehicle line-up to take advantage of the change. Thus, Chrysler would be at a competitive disadvantage. Ford and GM would continue to earn big-car profits without paying the intended civil penalties.

(3) Chrysler believed a reduction of the standard is symbolically unwise and poor public policy. The standards were a cornerstone of U.S. energy conservation policy.

(4) EPCA presumed that major shifts in sales mix would be required to achieve compliance and that the manufacturers might have to act to influence the appropriate sales mix. Chrysler charged that Ford and GM willfully did not adjust their marketing strategies.

(5) GM and Ford insisted that, under no circumstances, would they allow their companies to be found in non-compliance with Federal law. Chrysler argued that GM and Ford were bluffing when they threatened to shut down production and layoff workers in order to achieve compliance. Chrysler predicted GM and Ford would pay the civil penalties which, Chrysler argued, would be dwarfed by the profits earned on the larger cars.

Intermission: The Ruling on the Adjustment Factors

The significance of the outcome of NHTSA's ruling on the GM and Ford petitions was minimized by EPA's ruling on the pending adjustment factors, announced in late June 1985 while the ruling on the petitions was still pending.

In its rule, EPA made manufacturer-specific adjustments for MYs80-84 for a number of modifications to the test procedure. Among these were changes in the properties of the test fuel, the use of energy efficient oils, laboratory humidity, and changes in the increments set between vehicle weight categories. The rule also provides that the procedure used to calculate the adjustments for the prior model years would be carried over for MY85 and CAFE calculations for subsequent model years.

One automotive trade publication described the ruling on the adjustment factors as "generous beyond expectations." The net effect of the adjustment factors is to improve GM and Ford CAFEs by 2.7 mpg during the MY80-MY84 period, lifting GM out of penalty for MY84, and even giving it a credit of 0.9 mpg going into MY85. Previously, GM was entering MY85 -1.8 mpg in the red. Ford previously had an estimated credit of 0.8 mpg going into MY85; the ruling increases this to 3.5 mpg.

Chrysler was not pleased with the ruling, while another critic of the EPA decision -- Clarence Ditlow of the Center for Auto Safety -- remarked, "Why worry about CAFE when you can get relief through the back door?" Ford and GM nonetheless did not alter their position on their petition to lower the MY86 standard to 26.0 mpg.

Some three weeks after the final rule on the adjustment factors, on July 19, 1985, NHTSA announced a proposed rule to lower the model year 1986 standard to 26.0 mpg. NHTSA held hearings on the proposed rule in mid-August in which familiar arguments were made on both sides of the issue. The most concrete new observations were offered by Clarence Ditlow of the Center for Auto Safety. Ditlow claimed that Ford and GM's less optimistic projections of their MY86 and MY87 fuel economies were not solely the consequence of consumer demand for larger cars. Instead, Ditlow argued that it was partly the result of decisions by both manufacturers to retain older, rear-wheel driven models instead of replacing them with more efficient, front-wheel driven models. Making adjustments for this, and indications that Ford and GM might be considering lengthening the model year for some of their less-efficient cars, Ditlow alleged that the maximum feasible FY86 fuel economy was actually 27.1 mpg for Ford, and 26.7 for GM.

The ruling on the adjustment factors made the final decision on the Ford and GM petition to lower the standards less critical. Prior to the rulemaking on the adjustment factors, GM was entering the MY85 model year 1.9 mpg short of the standard, and Ford was 0.4 mpg short. This translated into potential penalties of $356 million for GM, and $38.5 million for Ford.

The decision on the adjustment factors, quite independent from the outcome of the petition, positioned Ford to enter MY85 with credits worth $70 million and reduced GM's negative position at the start of MY85 from $356 million to $47 million. It also meant that a final rule favorable to the petition would further reduce the magnitude of any potential civil penalties and postpone a possible day of reckoning. And, if Ford and GM, as they threatened, had to furlough workers or adjust product lines to achieve compliance, less extreme or prolonged policies of this nature would need to be implemented.

Congressional Action

Because the petitions requested a change in the regulations wholly within the prerogative of the Administration to make, Congress did not have an ostensibly significant role in this issue. However, the issue raised many of the same questions which have laced past Reagan Administration policies: what is the appropriate role of Government in markets? When is regulation deemed to be in the public interest and when it is unduly burdensome upon industry? Thus there was an interest in the Congress in how NHTSA ruled upon the petition, particularly because several hundred million dollars in fines that might be paid to the Federal Government rested upon the outcome.

There were some actions, however, which Congress might have taken. Representative Stark introduced legislation (H.R. 1425) which would eliminate the adminstrative discretion to adjust the standard below 27.5 mpg. Additionally, according to the public statements of GM and Ford, the prospect of being in non-compliance with Federal law was a greater concern than liability for the fines. Thus, it was also suggested that de-criminalizing the civil penalties to something akin to a fuel inefficiency tax might solve a number of problems: the standards would be preserved and Ford and GM would be held liable for failing to meet the standards. Ford, GM, and Chrysler have agreed on that one point: that it would be cheaper for GM and Ford to pay the penalties than to shut down production.

On July 29, 1985, the Senate debated an amendment offered by Senator Evans to S. 410, a bill providing for extension of the Residential Conservation Service. The amendment was identical to S.Res. 78, previously introduced by Senator Evans, a "sense of the Senate" resolution favoring retention of the 27.5 standards. One supporter of the amendment, Senator Eagleton, noting that it was too late to re-engineer the MY86 cars, argued that what was at issue at this point was whether GM or Ford were to be forgiven the fines for which they would be liable for noncompliance. However, Senator Nickles, accepting Ford and GM's contention that the manufacturers would indeed suspend production of less efficient vehicles to force their fleets into compliance, argued that there was little choice to be made between the prospect of a loss of as many as 110,000 jobs (Department of Commerce estimate) and a mere savings of two-tenths of one percent of petroleum consumption were the standard retained at 27.5 mpg. A motion to table the amendment passed, 52-39.

THE FINAL RULE

To little surprise, NHTSA's final rule, filed Oct. 3, 1985, established a 26 mpg standard for MY86. Among the major arguments NHTSA cited in support of its final rule were the following:

> (1) NHTSA determined that GM and Ford had had sufficient plans to meet the 27.5 mpg standard, but were prevented from "fully implementing those plans by unforeseen events." The ability to improve CAFE by marketing is relatively small because foreign car manufacturers, due to lower labor costs, are able to match any prices decreases. NHTSA determined that the only practical option for these manufacturers to achieve compliance in MY86 would be "product restrictions." The economic consequences were deemed unacceptable.
>
> (2) Some of the technological improvements, upon which the manufacturers' original projections of improved fuel economy were based, were unsuccessful. NHTSA noted in particular the collapse of interest in diesel-equipped passenger cars.

(3) In response to claims that GM and Ford had made product plan changes that would knowingly reduce CAFE, NHTS said that to the extent that such changes are in response to the market, "...holding manufacturers to product plans...no longer consistent with current market conditions" was tantamount to product restrictions. The agency concluded that Ford and GM's decisions to continue selling a higher proportion of larger cars was not inconsistent with the statutory criteria of economic practicability.

(4) Ford and GM both projected that their MY86 CAFE might approach 26.3 mpg. Given their large share of the market, NHTSA believed that setting the standard above their "maximum feasible capability" would be to exceed that level for the industry, taken as a whole. Given, too, some marketing and technological risks, 26.0 mpg seemed an appropriate industrywide standard for MY86.

Recent Developments: 26.0 MPG Returned in MY87-88

Under NHTSA's rule for MY86, the standard reverted to 27.5 mpg for MY87. In January 1986, the agency published a notice of proposed rulemaking inviting comment on where the standard should be set for model years 1987-88. The agency proposed to set the MY87-88 standards somewhere between 26.0-27.5 mpg. The agency defended this range, arguing that the record did not support raising the MY87 standard above 27.5 mpg nor lowering the standard below the level determined to be the maximum feasible fuel economy for MY86. On Oct. 6, 1986, the agency announced that the standard would remain at 26.0 mpg in MY87-88.

The public testimony and rulemaking for MY87-88 covered many of the same issues addressed in the earlier proceedings for MY86. An important new wrinkle was the decline in gasoline prices during 1986, which added to the unlikelihood that the manufacturers could effectively market additional volumes of smaller cars to boost their CAFE ratings. The agency also acknowledged the recent influx of new smaller cars from such countries as Yugoslavia, Korea, and elsewhere that could be sold at lower prices than comparable U.S.-manufactured vehicles. EPA also expressed fear that, without relaxation of the standard, the domestic manufacturers would have an incentive to manufacture their larger vehicles abroad so that these cars would not be included in the fuel economy calculation for domestically manufactured cars. This might mean a loss of jobs in the domestic industry which, the Agency noted, was not intended by they CAFE statute. The agency estimated that the reduction to 26.0 mpg during MYs 87-88 might mean a maximum increase in gasoline consumption of 0.29% of projected consumption over the lifetime of the fleet, and might very likely be less. Such a negligible savings, the agency concluded, would not "justify the potential sales losses and job losses associated with maintaining the 27.5 mpg standard for...two model years."

LEGISLATION

H.R. 1024 (Boxer)

Automobile Fuel Efficiency Amendments of 1985. Raises the CAFE standards for cars to 45 mpg in 1995. Requires fuel efficiency sampling of production vehicles and adjustment to reported fuel economy of those vehicles, if necessary. Requires updating twice-yearly of fuel economy guide. Introduced Feb. 7, 1985; referred to more than one committee.

H.R. 1425 (Stark)

Automobile Fuel Economy Standards Act of 1985. Amends the Motor Vehicle Information and Cost Savings Act to provide that the average fuel economy for passenger autmobiles manufactured after model year 1984 shall be a minimum of 27.5 mpg. Authorizes the Secretary of Transportation to amend such average fuel economy standard for model year 1986 and beyond to a level determined to be the maximum feasible average fuel economy level for the particular model year. Prohibits the Secretary from amending such standard to a level below 27.5 mpg for any model year. Introduced Mar. 5, 1985; referred to Committee on Energy and Commerce.

H.R. 3355 (Sharp et al.)

Among other provisions, amends the Motor Vehicle Information and Cost Savings Act to set fuel economy determination for methanol-powered automobiles. Introduced Sept. 18, 1985; referred to Committee on Energy and Commerce, Subcommittees on Energy Conservation and Power, and Fossil and Synthetic Fuels. Subcommittee hearings held Nov. 20, 1985.

H.R. 3435 (Glickman)

Amends the Motor Vehicle Information and Cost Savings Act to permit any automobile manufacturer to elect to have any of its alternative fuel-powered vehicles included in the average fuel economy calculated by the EPA Administrator. Introduced Sept. 26, 1985; referred to Committee on Energy and Commerce, Subcommittee on Energy Conservation and Power.

S.Res. 178 (Evans et al.)

Expresses the sense of the Senate that the Administrator of the National Highway Traffic Safety Administration should retain the current corporate average fuel economy standard for passenger automobiles. Introduced June 6, 1985. Hearing held July 17, 1985, before Committee on Commerce. Resolution was offered as an amendment to S. 410, July 29, 1985. A motion to table passed, 52-39.

HEARINGS

U.S. Congress. Senate. Committee on Energy and Natural Resources. Subcommittee on Energy Regulation and Conservation. Automobile fuel economy standards. May 14, 1985. S.Hrg. 99-138. 352 p.

CHRONOLOGY OF EVENTS

01/22/86 -- The National Highway Traffic Safety Administration invited comment on the appropriate CAFE standard for model years 1987 and 1988, to fall within a range of 26.0-27.5 mpg.

ADDITIONAL REFERENCE SOURCES

Henderson, David R. The Economics of Fuel Economy Standards, appearing in: American Enterprise Institute for Public Policy Research. Regulation: AEI Journal on Government and Society. Jan/Feb 1985: p. 45.

EPA provides windfall for makers. Automotive news. July 15, 1985: p. 6.

U.S. Federal Register. Environmental Protection Agency. Fuel economy test procedures; Final rule and proposed rule. Vol. 50, no. 126. Monday, July 1, 1985, p. 27172-27187.

----- Passenger automobile average fuel economy standards for model year 1986. Final rule. Vol. 50, no. 193, Friday, Oct. 4, 1985: p. 40528-40549.

----- Passenger automobile average fuel economy standards for model years 1987-88; proposed amendments and notice of meeting. Vol. 51, no. 14, Wednesday, Jan. 22, 1986: p. 2912-2923.

----- Passenger automobile average fuel economy standards or model years 1987-88; Final rule. Federal register, Vol. 51, no. 193, Monday, Oct. 6, 1986: p. 35594-35620.

U.S. Department of Transportation. National Highway and Traffic Safety Administration. Automotive Fuel Economy Program. Ninth Annual Report to the Congress. January 1985. 25 p.

The **Chairman**. I share your view on that.

Secretary Hodel, accompanied by Secretary Horn, we are very pleased to have you.

STATEMENT OF HON. DONALD PAUL HODEL, SECRETARY OF THE INTERIOR, ACCOMPANIED BY WILLIAM HORN, ASSISTANT SECRETARY OF THE INTERIOR FOR FISH AND WILDLIFE AND PARKS

Secretary **Hodel**. Thank you, Mr. Chairman.

First, if I may submit for the record, I have a prepared statement I would like to summarize.

With me, as you have indicated, is Assistant Secretary William Horn, Assistant Secretary for Fish and Wildlife and Parks.

I need to say, Mr. Chairman, for openers that you have made an excellent statement of the basic background and circumstances. I will not, therefore, repeat any of that, but rather turn directly to a discussion of the Arctic National Wildlife Refuge itself.

We have here a chart—a map—which indicates, first, its location in Alaska, which is the northeasternmost corner of the State of Alaska. The entire area is 19 million acres in size. The 1002 lands which are marked in red on this map represent 1.5 million acres or about 8 percent of the area.

The blue portion represents 8 million acres that have already been designated as wilderness. So we have here a mixed situation, 19 million acre refuge of which 8 million acres are wilderness; and then we have the 1.5 million acres—the 1002 area—which have important fish and wildlife values, as well as important geological prospects, which is why Congress directed us to carry out the studies.

Geologists indicate that they think the 1002 lands constitute the best potential area for oil and gas that has yet to be discovered in North America. There are 26 geologic structures that have already been identified through the seismic work that has been done.

Because it sits between Prudhoe Bay and the Canadian fields of the MacKenzie Delta and the Beaufort Sea, it is anticipated that this is a generally productive area. It is thought, on the high end of the scale, that it could be as large as Prudhoe Bay. Therefore, it would have the effect of replacing Prudhoe, as you indicated, now producing 20 percent of America's domestic production of oil, on which it is on the decline.

As Prudhoe begins to diminish, with the time it takes to explore and develop and ultimately begin producing, it appears that there would be a fairly appropriate replacement of Prudhoe by the 1002 area's production. In addition you would have a pipeline available.

If we talk about the energy situation, in the country today our production is falling. Our consumption is rising, and our imports are therefore rising. We are already importing more oil on a percentage basis than we were importing as a Nation in 1973, when the Arab OPEC embargo was imposed upon us.

Perhaps it would be appropriate at this point, Mr. Chairman, to comment on something that Senator Wirth raised. That is the issue of an energy policy and the context within which we are making this particular proposal. The question is a good one.

It is a natural one that comes to mind as soon as we hear discussion of replacing our oil requirements. We do have an energy policy. It is to provide an adequate supply at reasonable cost. There are two basic strategies for getting there, one of which is to have a balanced and mixed energy supply.

Balanced and mixed, of course, means not only conventional resources such as oil and gas, coal and nuclear, but renewables—solar, wind, geothermal, ocean thermal, energy conversion, biomass and the like—and conservation in both forms, both reduction in consumption, just plain using less on the one hand, and on the other hand producing the same amount of work, but using less energy through more efficient means.

We have large areas there where honest people can disagree on the precise amount, precise quantities, and precise approach that ought to be taken. The thrust of this Administration has been to try to pursue research and development in those areas which would help bring the costs of renewables and conservation down so that they would be competitive with the conventional resources.

Let me suggest that, even if we had draconian cutbacks in consumption of oil in this country, far below anything that I think the most optimistic of those seeking that as a solution envision—for instance, a 20 or 25 percent drop in oil consumption in this country—every indication today is that without finding significant new resources, in the year 2000, this country will still be very heavily dependent upon imports.

Just to put some numbers on it, today we are consuming about 16.3, call it 16, million barrels of oil a day. We are importing about 40 percent of what we consume. We are producing, counting natural gas liquids, slightly in excess of 10 million barrels a day.

The net result is, if we were to cut back on consumption by as much as 4 million barrels a day, which would be a 25 percent cutback, and if we reduced our consumption to 12 million barrels a day, with the falling production in the United States that is forecasted without new finds (we will only be producing in the neighborhood of 5 to 7 million barrels a day in the year 2000), we would still be importing 5 to 7 million barrels a day, depending upon that amount.

If we have the good fortune to find another Prudhoe Bay on the Arctic Slope, Mr. Chairman, the effect would be simply to reduce by a million and a half or 2 million barrels a day the amount of imports in the year 2000. It is not a matter of making this Nation independent. It is not a matter of displacing other resources.

It is a matter simply of trying to diminish the rate at which we become unduly dependent. And of course, the lead times are not insignificant. In frontier areas, we have learned that it takes from 7 to 15 years from the time we start the process to the time the oil can begin to flow in the commercial pipeline.

In fact, that sometimes has been raised to me as a reason why we should not go forward. The comment is made, "Well, if we are concerned about possible upsets in the world oil market, here is something that will take 7 to 15 years to acquire, so why are you bothering to go after it now?"

I think, first of all, if we do not start now, we will not have this available to us in the mid-nineties, if it is there, or the year 2000, if it is there. More importantly, I think we would send an enormously bad signal to the rest of the world, which believes with us that this is an enormously high prospect area.

We would send an enormously bad signal to the rest of the world that we were unwilling even to try to help ourselves solve some portion of our problem.

Environmentally, this area has been studied extremely carefully. More than 50 environmentally based biological studies have been made on the impacts of exploration, development drilling, and production. Let me say first of all that everything indicates that exploration and development drilling would have negligible impacts.

And the reason for that is that the wildlife, particularly the caribou, which are the wildlife thought most to be potentially affected here, are only in the area 6 to 8 weeks a year. That is during their calving and insect relief period.

They are there for such a short time that it is entirely possible to do your exploration and development drilling, by stipulation under the leases, at a time when they are not in the vicinity. In fact, that is how the seismic work has been done.

It was done during the period when the area was frozen solid. We required that care be taken that vehicles operate, insofar as possible, on thick snow so that they did not damage even the frozen tundra, the effect of which has been that it is barely evident that any activity has taken place there.

Therefore the timing of exploration and development drilling can be controlled and can be done at a time when the caribou are not in the area.

It is production that holds the possibility of having an effect upon the caribou herd. In the report that we have submitted to the Congress, we indicate that that could have a major effect. Let me emphasize that "major effect" is defined to mean displacing, causing the caribou to move from one place to another.

Now, the obvious fact is that if some portion of this area is occupied by a road or by a drilling pad, caribou cannot, will not occupy that same drilling pad. We have learned at Prudhoe Bay that they will displace 1 to 3 kilometers from human habitation or human activity for their calving activities. They will move off from those areas in order to have calves.

We also have learned at Prudhoe Bay that this activity is not incompatible with a thriving caribou population. In spite of the predictions back in the late sixties and early seventies that production at Prudhoe Bay would have the effect of devastating the caribou herd, that it could or would have a disastrous effect—and those were the words used—the caribou herd at Prudhoe Bay, which is the Central Arctic herd, has tripled in number during the period of development of Prudhoe Bay and its operation.

Now, that is partly because there is a very limited amount of direct physical impact, even if you have a substantial development. The 1002 area, again, is 1.5 million acres in size, the red area on the map.

We anticipate that, if our mean, which is the middle, situation occurred and 3.2 billion barrels of recoverable oil are found, that it would require the occupation of about 12,650 acres. Now, that is the occupation. Mind you, the caribou would for calving purposes during that six to eight week period a year, move off another one to three kilometers.

But that is less than 1 percent of the 1.5 million acres. The activity would physically occupy and disrupt their activities in a relatively small area, assuming that oil is there.

As a result of these conclusions, Mr. Chairman, I believe that this country does not have to choose between protecting the environment on the one hand and an adequate energy supply on the other. At the very least we have an obligation to go forward and seek to ascertain what it is that may be there in the way of a potential energy supply.

There are a series of recommendations which I have outlined in my prepared statement indicating the kinds of things we think the Congress should enact. They include providing for protection under NEPA and other laws; delegation authority and so forth; adopting the final LEIS as the programmatic EIS for the 1002 area; and authorizing exploration and development activities in the Kaktovik Inupiat Corporation area, which is the white space, that is the relatively small area above the word "lands" in the 1002 area.

As I say, Mr. Chairman, I do not think we have to choose between the two. I hope that the Congress, after it has had its careful deliberation on this matter, will reach the same conclusion and will authorize an appropriate, carefully timed exploration and development program.

[The prepared statement of Secretary Hodel follows:]

STATEMENT OF DONALD PAUL HODEL, SECRETARY OF THE INTERIOR, BEFORE THE COMMITTEE ON ENERGY AND NATURAL RESOURCES, UNITED STATES SENATE, CONCERNING THE ARCTIC NATIONAL WILDLIFE REFUGE COASTAL PLAIN RESOURCE ASSESSMENT REPORT TO CONGRESS.

JUNE 2, 1987

Mr. Chairman, I am Donald Paul Hodel, Secretary of the Interior. I appreciate the opportunity to appear today to discuss the report to Congress concerning the coastal plain of Alaska's Arctic National Wildlife Refuge.

As you know, section 1002 of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) directed the Secretary of the Interior to:

° conduct biological and geological studies of the 1.5-million-acre coastal plain portion of the Arctic Refuge (the "1002 area"), located in northeast Alaska:

° report the results of those studies to Congress; and

° recommend to Congress whether the area should be made available for oil and gas exploration and development.

During deliberations in 1977-80 about management of lands in Alaska, Congress expressed particular interest in the possibility of significant oil and gas deposits in the 1002 area and in the effect of development on the area's fish, wildlife, and wilderness resources. The Congress set forth a deliberate process for the Department of the Interior to study, analyze and report on all of these resources and to provide a recommendation on future management of the 1002 area.

On April 20th, I made public the final report and my preferred alternative recommendation for the 1002 area--that is, an orderly and environmentally sound program for leasing the entire 1002 area.

The results of the geological studies of the 1002 area have led industry and government geologists to conclude that the 1002 area is the Nation's best single opportunity to increase significantly domestic oil production over the next 40 years. It is rated by geologists as the most outstanding petroleum exploration target in the onshore United States. Data from the Prudhoe Bay area and in the Canadian Beaufort Sea and Mackenzie Delta, combined with promising seismic data gathered on the 1002 area, indicate geologic conditions exceptionally favorable for discovery of one or more supergiant fields (larger than 500 million barrels).

The area could contain potentially recoverable oil resources of more than 9.2 billion barrels, an amount nearly equal to the Prudhoe Bay oil field, which currently provides almost one-fifth of U.S. domestic production. If this estimate proves to be correct, development of the 1002 area resources would add significantly to domestic reserves.

Production from the 1002 area could begin at a time when a decline in production is expected at Prudhoe Bay. Prudhoe Bay production is expected to peak this year and will have declined significantly by the year 2000. Production of the 1002 area's potential resources could substantially offset this significant and certain decline.

The proximity of the 1002 area to Prudhoe Bay and the Trans-Alaska Pipeline System also is an important factor. The Trans-Alaska Pipeline System provides a ready means for bringing 1002 area oil to U.S. markets, and would prolong the useful life of the pipeline system and permit continued production from North Slope fields which otherwise would be uneconomical.

Based on the mean conditional recoverable oil estimate of 3.2 billion barrels, 1002 area production by the year 2005 could provide 4 percent of total U.S. demand and 8 percent of U.S. production (about 660,000 barrels per day); and reduce imports by nearly 9 percent. This could provide net national economic benefits of $79.4 billion, including Federal revenues of $38.0 billion.

If the 5 percent chance of more than 9.2 billion barrels of recoverable oil became a reality, this could yield production of more than 1.5 million barrels per day. Estimates of net national economic benefits based on 9.2 billion barrels of oil production, and other economic assumptions, are as high as $325 billion.

This Nation currently imports more than one third of its domestic oil needs, and the National Petroleum Council predicts that in the year 2000 the U.S. will import between 52 to 68 percent of its demand. Oil production from the 1002 area would reduce not only the need for imported oil but also the amount of foreign exchange required to pay for petroleum imports, bringing about a more favorable balance of trade. In 1984, the gross cost of importing crude oil and refined petroleum products was more than $59 billion, an amount approximately equal to 50 percent of the U.S. trade deficit. The cost of imports in 1986 was $28 billion as a result of lower oil prices. However, the Department of Energy has predicted that by 1995, oil imports may cost the equivalent of $80 billion.

America's growing reliance on imported oil could have potentially serious implications for our national security as well.

Production from the 1002 area would reduce U.S. reliance on oil from the unstable Persian Gulf region, would reduce our vulnerability to disruptions in the world oil market, and would contribute to our national security.

Because the 1002 area is the best domestic opportunity to help reverse or reduce the decline in U.S. oil reserves and production, the public interest demands that the area be made available for oil and gas leasing, with exploration and development conducted in an orderly and sensitive manner to avoid unnecessary adverse effects on the environment.

Our ability to conduct oil exploration development, and production in a careful and environmentally sound manner is a major factor leading to my conclusion that full leasing is the preferred alternative.

Environmental Consequences of Development

The 1002 area provides a variety of outstanding arctic habitats which support fish and wildlife species of national and international significance, including muskoxen, snow geese, and the Porcupine caribou herd--the sixth largest caribou herd in North America.

More than 50 separate biological studies were conducted in the 1002 area since 1980. These data were synthesized in the final report and legislative environmental impact statement (final report/LEIS) and used to provide the best assessment of the potential environmental consequences of oil development in the 1002 area.

Potential impacts were assessed at three stages: exploration, development drilling, and production. The impact analyses predicted that exploration and development drilling activities would generate only minor or negligible effects on all wildlife resources on the 1002 area. Therefore, the focus of potential impacts is on production and assumes the discovery of 3.2 billion barrels of producible oil (mean conditional recoverable estimate). The impact analyses concluded that in fact more than 9.2 billion barrels could be produced with no significant additional environmental impacts than would result from production of 3.2 billion barrels.

Production is expected to directly affect only 12,650 acres or 0.8 percent of the 1002 area. The consequences of this level of production on important species such as brown bears, snow geese, wolves, and moose, as well as the Central Arctic caribou herd, are expected to be negligible, minor, or moderate.

The only potential "major" effects would result from oil production and are limited to the Porcupine caribou herd and the reintroduced muskox herd. "Major biological effects," for purposes of the analysis, were defined as: "widespread, long-term change in habitat availability or quality which would likely modify natural abundance or distribution of species. Modification will persist at least as long as modifying influences exist."

Porcupine and Central Arctic Caribou Herds

Although comparing the effects of Prudhoe Bay development on the Central Arctic caribou herd with the potential effects of similar activities in the 1002 area on the Porcupine caribou herd must be done with caution, experiences at Prudhoe Bay provide a strong measure of assurance that caribou can coexist successfully with oil development.

Substantial empirical evidence has been gathered over the years regarding the interaction of the Central Arctic herd with the Prudhoe Bay complex. Although that herd has had a considerable portion of its range, including calving areas, occupied by oil-production facilities, the herd has prospered and, in fact, tripled in size since oil activities began in the area in 1968.

The fact that billions of barrels of oil have been produced and transported from Prudhoe Bay while the area's fish and wildlife resources continue to thrive indicates that effective environmental techniques and technologies are available for use in the 1002 area, a short distance to the east.

Biological studies have found that the Porcupine caribou herd calves in different areas each year--throughout the 1002 area, elsewhere in the Arctic Refuge, and in Canada--on an area totaling approximately 8.9 million acres. Moreover, the Porcupine caribou herd is present in the 1002 area for calving, postcalving, and insect-relief activities only 6 to 8 weeks annually, primarily from mid-May to mid-July.

The Porcupine caribou herd has shown some preference for calving on the Arctic Refuge coastal plain, including the upper Jago River area (84,000 acres or 5.4 percent of the 1002 area) where portions of the herd have calved in approximately half of the last 15 years. Thus, a potential "major" consequence would be the displacement of those portions of the herd seeking to calve in the upper Jago River area. This would be the case only if the area were the site of a major producing oil field. It is unlikely, though possible, that such displacement would result in any appreciable decline in herd size.

It is important to note that this issue of displacement is a primary matter of concern regarding the Porcupine caribou herd. Although it is not known whether development, including roads and oil pipelines, could affect the migratory habits of the herd, it already encounters the Dempster Highway in Canada during its annual migrations and crosses the road with no measured adverse effects. Similarly, other caribou herds in Alaska and Canada (i.e., Nelchina, Fortymile, and Central Arctic) routinely cross highway and road systems. Both the Central Arctic and Nelchina herds also routinely cross the Trans-Alaska Pipeline with no adverse effects. This pattern of successful interaction with roads and pipelines during migration is expected for the Porcupine caribou herd.

In addition, the Porcupine caribou herd should not be affected adversely during the short-term period (6 to 10 days) that they use 1002 area habitats for insect-relief following calving. The ability of the herd to move to insect-relief areas along the coast is unlikely to be significantly affected by pipeline/road corridors crossing the 1002 area.

Furthermore, the long period of time required to bring commercial fields into production would provide ample opportunity to develop any additional mitigation measures as may be needed to address unexpected impacts.

Biological predictions necessarily are cautious. In the 1972 environmental evaluation for the Trans-Alaska Pipeline System, the following possible effects on the Central Arctic herd were predicted: "The combined barrier effects of the highway and pipeline might very well reduce the number of animals using the winter range east of the highway." As events have demonstrated, however, these concerns subsequently were resolved completely with environmentally sensitive techniques and technologies.

Biological predictions in the final report/LEIS for the 1002 area naturally are cautious as well.

Muskoxen

Muskoxen disappeared from the 1002 area at the turn of the century as a result of overhunting. Those that now occupy the area are the result of a successful reintroduction program. The potential effects of oil and gas activities on the area's muskoxen also are unknown, although biologists predict that "major" effects could be: (1) substantial displacement from currently used habitat and (2) a slowing of the herd's growth rate, as distinguished from a diminution in herd size.

Subsistence

With regard to subsistence, potential effects of 1002 area oil production fall into two categories· effects on the village of Kaktovik and effects on villages far removed from the 1002 area. In the case of Kaktovik, it is possible that a "major" restriction of subsistence activities could occur. These consequences would not likely result from reduced wildlife resources but rather could result from the physical changes proximate to Kaktovik which could interfere with traditional activities. Moreover, distribution patterns of wildlife resources likely to be affected by oil production would necessitate some alterations in traditional subsistence patterns.

We are committed to working with the village of Kaktovik, the North Slope Borough, and the State of Alaska to minimize the effects of oil activities on the subsistence activities of Kaktovik residents.

Subsistence effects on villages outside the 1002 area, including those in Canada, are expected to be minimal. Because it is most probable that oil activities will not create adverse population changes in the Porcupine caribou herd, other villages which annually use these caribou resources should not be affected. Migratory patterns of the herd also are likely to be unaffected by oil activities. Accordingly, the herd is expected to adhere to its traditional patterns which make it available annually to these villages.

We recognize the importance of ensuring the continued customary and traditional use of this internationally shared resource, and we are committed to efforts that will conserve the Porcupine caribou herd for future generations of people who rely on this resource for nutritional, cultural, and other essential needs. The Porcupine caribou agreement we are pursuing with Canada will enhance international cooperation and coordination on management of the Porcupine caribou herd so that both countries can effectively secure the availability of this resource.

Environmental Safeguards and the Leasing Process

The potential effects predicted were considered fully throughout the final report/LEIS and in the development of my recommendations. Site-specific measures can be taken to avoid unnecessary adverse effects on the environment from oil production in the 1002 area.

Although the exact process would depend upon the leasing program established by the Congress, steps which might be included in such a leasing program are:

° Compliance with the National Environmental Policy Act (NEPA) for each lease sale, each exploration plan, and each operator/lessee development and production plan.

° Compliance by each operator/lessee, or the Department of the Interior, as appropriate with other such laws as the Clean Air Act, Clean Water Act, Endangered Species Act, National Historic Preservation Act, and ANILCA. The lease also would be governed by Departmental regulations.

° The Secretary should be given authority to establish requirements for oil and gas operations that allow them to proceed in an economically reasonable manner but avoid unnecessary adverse effects on the 1002 area's wildlife, habitat, and environment.

° Competitive leasing authority should be granted to the Secretary to delegate as he believes proper and should be similar to that used to lease the National Petroleum Reserve in Alaska. The Secretary should also have authority to decide such issues as unitization, drainage, diligence, and lease terms and management.

° The Secretary should be granted authority to suspend or terminate any leases in the 1002 area at any time, in the same manner prescribed by the Outer Continental Shelf Lands Act as amended. If leases are terminated for reasons beyond the control of the operators/lessees, operators/lessees should be compensated in a manner similar to that prescribed by the Outer Continental Shelf Lands Act as amended.

° The Secretary should have the authority to require lessees to restore the leased tract to protect environmental values to the extent reasonably possible and desirable.

° The Secretary should be granted authority, which supersedes ANILCA Title XI, to grant rights-of-way and easements across 1002 area lands for oil-and-gas-related activities and facilities. This authority must allow the Secretary to require siting and modifications of proposed facilities to avoid unnecessary duplication of roads and pipelines.

° All geological and geophysical data acquired with respect to the 1002 area should be shared, upon request, with the Secretary, who should ensure its confidentiality.

In light of the extensive environmental analysis done to prepare the final report/LEIS I recommend that it be adopted statutorily as the programmatic EIS for a leasing program for the 1002 area.

Because Section 1002(i) of ANILCA withdrew the 1002 area from operation of the mineral leasing laws, and Section 1003 prohibited "leasing or other development leading to the production of oil and gas" in the area "until authorized by an Act of Congress," specific legislation must be enacted to implement these recommendations.

In recommending that Congress enact legislation to open the 1002 area for oil and gas leasing, I also recommend that Congress enact legislation to open the Kaktovik Inupiat Corporation (KIC)/Arctic Slope Regional Corporation (ASRC) lands within the Arctic Refuge to similar activities. The ASRC's right to develop and produce any oil and gas which may underlie the KIC/ASRC lands within the Arctic Refuge is, by virtue of the 1983 Chandler Lake Exchange Agreement, expressly contingent upon Congressional authorization of oil and gas leasing or development and production within the 1002 area, or on the KIC/ASRC lands specifically.

Consultations with Canada

Before I conclude my remarks, I'd like to address the issue of consultations with the Canadian government. Once the draft report/LEIS was made available to the Congress and the American public, it was also made available to Canada. We feel it was appropriate to then enter into formal consultations with them regarding the draft recommendation. However, coordination with Canada regarding the Porcupine caribou herd has been ongoing since the late 1970's

In conducting biological studies for the 1002 area related to the Porcupine caribou herd, the U.S. Fish and Wildlife Service worked closely with biologists from the State of Alaska and the Canadian Wildlife Service. The Canadian Wildlife Service and its Yukon Wildlife Branch conducted independent studies of the Porcupine caribou herd during 1978-81 relative to potential oil and gas development in Canada's Yukon and Northwest Territories. Prior to assessing potential environmental consequences of oil and gas development in the 1002 area, the Fish and Wildlife Service conducted a Caribou Impact Analysis Workshop in which Canadian biologists participated at our invitation.

In addition to these technical consultations, representatives of the Fish and Wildlife Service and Canadian Wildlife Service for the past several years have been negotiating a separate Porcupine caribou herd agreement. The final draft agreement, now being reviewed within the Department; calls for both countries to take appropriate steps to ensure international cooperation and coordination of actions that might affect the Porcupine caribou herd in order to conserve the species and its habitat. The agreement would establish an advisory board to make recommendations and provide advice to each government to assist in this management effort. Such an agreement will enhance the consultative mechanisms between Canada and the United States on future activities that may be conducted on either side of the border.

When the draft 1002(h) report was made available to the Congress and public for review in November 1986, the Assistant Secretary for Fish and Wildlife and Parks invited the Government of Canada to comment on the draft. To date, three consultation sessions have been held, two in Ottawa and one in Washington, D.C. These sessions provided both countries the opportunity to discuss the biological and geological data upon which this final report/LEIS is based and to address the assessment of impacts on the Porcupine caribou herd and other wildlife resources by possible development activities. Consultations will continue upon request by either country, and the Department of the Interior looks forward to future opportunities to discuss with Canada resource issues of mutual concern.

Conclusion

In conclusion, given the proven record that potential environmental effects of oil production can be avoided substantially, and given America's need for additional domestic energy resources, it is essential that the Congress enact legislation to authorize the Secretary of the Interior to conduct an orderly oil and gas leasing program for the entire 1002 area.

Authority to lease the 1002 area is needed now in order to determine whether economically recoverable reserves exist and to produce those resources for America's future. Even if exploration resulted in commercial finds today, it could be as long as 10 to 15 years before those resources would be brought into production. If we delay, our inaction would serve to blindfold America to its ability to increase domestic production. It also would send a dangerous signal to the world oil market that America is not willing to help itself avoid increased dependence on the Middle East's substantial concentration of the world oil supply.

This Nation has proven that it need not choose between an improving environment on one hand, and exploration and development of the energy resources required for growth and survival on the other. We can have both. It is my firm belief that an orderly oil and gas leasing program for the entire 1002 area can be conducted in concert with America's environmental goals.

This concludes my statement, Mr. Chairman. I would be pleased to answer any questions you or any of the other Committee members might have.

The **Chairman**. Thank you very much, Mr. Secretary.

Mr. Secretary, these 1002 lands are 1.5 million acres. The 26 structures, are they spread evenly throughout that or are they clustered? Can you enlighten us on that?

Secretary **Hodel**. Assistant Secretary Horn, Mr. Chairman, is going to get a map which identifies the structures which have been determined through the seismic activities. On this map, we are now looking only at the 1002 area.

The outer boundary is the 1002 area. The 26 structures are marked in blue on this map. As you see, some are either adjacent to or overlapping each other. Some are very, very large in size.

The two large ones near the bottom of the chart, I understand exceed in size the pool that has been tapped at Prudhoe Bay.

The **Chairman**. The bottom one down there?

Secretary **Hodel**. The bottom.

There are four there, I am told. The two large ones are up above adjacent to the KIC lands and the two large lower ones are just to the left of the Aichilik River, which are larger than Prudhoe.

The **Chairman**. Now, would you propose to lease the entire 1002 area at one time or divide it up into areas? Or what are the plans for that?

Secretary **Hodel**. Well, ordinarily, Mr. Chairman, what we would do in a case like this is have a leasing program which would be somewhat phased, because as a practical matter we have a lot of preliminary work that has to be done in putting together a leasing program.

I am likening this in my mind's eye to the Outer Continental Shelf leasing program. We would try to make it in sequences that make some sense. Ordinarily, and I am guessing at this point because I do not think we have resolved this because we feel this is the kind of thing we do have to discuss with the Congress, my thought would be to have a phased leasing approach.

The **Chairman**. And that would be phased in over how many years?

Secretary **Hodel**. Presumably, you would have an annual lease sale, at which additional lands would be made available. Experience from the prior year would then begin to feed into the process.

One of the things that we would take into account is the actual amount of activity that would be called for and the amount of development that would be called for as a result of that. Let us say you leased one of the three areas. If you lease one of those in the first year, there is drilling activity in that first year; and it indicates that there are substantial prospects there, that indication might have an effect on the ability to go forward with the leasing program in the other areas. Just as a practical matter, we would move toward development of the first-found areas.

The **Chairman**. Now, Mr. Secretary, as I understand it the exploration offers no insult to the caribou herd, no potential for damage to the caribou herd, because it is done off-season, really in the dead of winter, when the area is frozen.

Would you explain why you cannot divide it into two phases, first exploration and then you would know whether there is this rich oil find, then decide whether or not to develop? Would you explain why you cannot do that?

Secretary **Hodel**. Well, it is not that one could not, because of course one could, but whether one should or should not is an issue that I have tried to address in discussions elsewhere.

If exploration takes place and there is no oil there, development drilling is academic. Nobody is going to do it. If, in fact, the oil is there and it is deemed to be commercial, the question I have is why would we wish to say we are not going to go forward with the development?

It seems to me the decision to explore determines that, in the event oil is there, it should be developed. Now, further, that conforms to the real world, the commercial world in which we deal. If we are leasing tracts to people who are going to expend enormous sums of money, tens of millions of dollars, to do the work necessary to explore, it is very disruptive to their economic planning and it is very cost intensive for them to pull out of the area and then have to wait for a second phase to, for instance, pass the Congress or go through an entirely separate development stage.

The **Chairman**. In other words, you are not likely to get private companies to go in and do the exploration drilling unless they know they can develop if they find some oil?

Secretary **Hodel**. This is such a hot prospect, Mr. Chairman, that I would be hesitant to say that they would not go in. However, but I think it would affect the quality of the bids and the number of those who are willing to make the effort. It would also ultimately affect very significantly the cost to the consumer of the oil which would be found there.

I think that the threshold decision is, should it be opened for exploration and development in the event there are commercial quantities there.

The **Chairman**. And would you explain why the Government could not or should not do the drilling, the exploration drilling?

Secretary **Hodel**. Mr. Chairman, we have had some experience with the Government conducting a drilling program in the National Petroleum Reserve, which is to the west of Prudhoe Bay. I think our experience there suggests that all the wrong incentives were operating.

In the case of a Government drilling program, the incentive is to spend the money that has been appropriated for drilling, whether or not one finds something. There is no particular incentive or payoff to the Government for finding.

Obviously, there are very significant consequences to the United States, but the incentive system is not operating in the same fashion. The decisions as to where the drilling should take place will vary from individual to individual, geologist to geologist, company to company.

One of the great advantages of a leasing program as distinguished from a Government-paid drilling program is that we get the same people looking at the same seismic charts reaching different conclusions about where the drilling ought to take place. I know you are quite familiar with that in your own State.

It is amazing how often somebody with a slightly different idea turns out to be the right person. We tend to screen that out in a Government drilling program.

It is very difficult for the Government to support the exotic or the different point of view, because the question will later be, if nothing if found there well, why did you spend so much money on what everybody knew was a foolish effort.

The CHAIRMAN. Now, speaking of the caribou herd, how many caribou are in the herd at the present time?

Secretary HODEL. Current estimates are there are about 180,000 in the Porcupine caribou herd, which is the herd that occupies a portion of this area.

The calving area for this caribou herd is 8.9 million acres. So the 1002 area is in fact only a portion of the calving area occupied.

The CHAIRMAN. The caribou winter in Canada?

Secretary HODEL. They winter mostly in Canada. They migrate out of this area into the higher country and will be found from time to time scattered in the area south and largely east.

The CHAIRMAN. And they are used for subsistence hunting by the natives in Alaska?

Secretary HODEL. Yes, in Alaska and in Canada.

The CHAIRMAN. And how many are harvested for those purposes?

Secretary HODEL. From my understanding, it is a fairly small number. It is in the range of a thousand or so caribou that are harvested.

Perhaps Assistant Secretary Horn has a comment on that.

Mr. HORN. Senator, we are looking at approximately a thousand caribou, give or take, being taken in Alaska by villagers from Kaktovik, Arctic Village, Chalkesik, and Fort Yukon.

We may be looking at three to four times that amount, 3,000 to 4,000 animals, being harvested on the Canadian side. The Canadian harvest is higher because these animals cross the Dempster Highway in Canada during their migrations and access to this herd is considerably easier in Canada than it is in the United States.

The CHAIRMAN. Is that limited to natives in Canada?

Mr. HORN. No, sir.

The CHAIRMAN. Just anyone can?

Mr. HORN. Under provincial, territorial, or federal game regulations.

The CHAIRMAN. Now, in Alaska non-Natives may not hunt the herd?

Mr. HORN. No. All residents may hunt them. Basically, because of the remoteness of this area, I am unaware of any appreciable sport harvest of caribou in this part of Alaska at all. Of course, there are dozens of other caribou herds far more accessible to non-Native folks in Alaska.

The CHAIRMAN. You say there are?

Mr. HORN. There are dozens of other caribou herds in Alaska, at least a dozen other caribou herds elsewhere in Alaska, that are more accessible to non-Native sport hunters.

The CHAIRMAN. How big are the other caribou herds in Alaska?

Mr. HORN. The largest herd in Alaska is the western Arctic herd, which occupies the area of the National Petroleum Reserve. The western Arctic herd is somewhere in the vicinity of 240,000 plus animals at this time. That traditionally has been the largest herd.

The Porcupine caribou herd is traditionally the second largest caribou herd in Alaska. Then we have a host of others that can range anywhere from 5,000 up to 30,000 or 40,000 animals. This would include the 40 Mile herd, the Nelchina herd, the Mulchatna herd, the herd that occupies the area around Donally Park, the Alaska Peninsula caribou herd. We have a small reintroduced herd on the Kenai Peninsula.

Those would be the major caribou populations elsewhere.

The **CHAIRMAN**. You say reintroduced herd?

Mr. **HORN**. Yes. Caribou were essentially eliminated from the Kenai Peninsula area through a combination of hunting and habitat change. The Fish and Wildlife Service, in cooperation with State fish and game, is actively reintroducing caribou on the Kenai Peninsula, and it now appears to be it is an emerging success story.

The **CHAIRMAN**. And what would the total caribou population of Alaska be?

Mr. **HORN**. I would venture to say it is pretty clearly, probably approximately a million animals. We can get you the exact number. We would have to consult with the State fish and game people.

The **CHAIRMAN**. And this herd is about 180,000?

Mr. **HORN**. Yes, sir.

The **CHAIRMAN**. So this is 18 percent of the total, roughly?

Mr. **HORN**. Roughly.

The **CHAIRMAN**. I have more questions, but I think my time is up. Now, in the order of when Senators came in, next would be Senator Bingaman.

Senator **BINGAMAN**. Thank you, Mr. Chairman.

Mr. Secretary, you said that you will have a phased-in leasing program. If all went as planned according to your best intentions, when would you expect that to start?

Secretary **HODEL**. That would start as soon after the passage of enabling legislation as is possible. I phrase it that way because it would depend partly upon the nature of the legislation.

Let us assume that the Congress passed legislation which authorized immediate leasing. It would take us probably in the neighborhood of a year simply to organize and put out the necessary call, to receive the necessary public comment; and to provide the specifications that we would require for leases and so forth in order to have the ability to provide a lease which somebody could take with some confidence, knowing what it was he was acquiring.

Senator **BINGAMAN**. So if Congress were to act favorably on your proposal in 1988, then you would expect in 1989 some time to actually be able to lease some of this land, or 1990? What would be your expectation?

Secretary **HODEL**. I would think one year following passage of legislation would be about the earliest that one could anticipate.

Senator **BINGAMAN**. And then I think you indicated that there would be seven to 15 years of lead time. I gather that is from the time the leases are issued, is that correct?

Secretary **HODEL**. Pretty much.

Senator **BINGAMAN**. So you would expect production to actually get to market within seven years?

Secretary **HODEL**. It would depend a great deal on the success of the first lease sale. Obviously, that is why I gave such a wide range. Seven to 15 years is a fairly wide range. It is the range that we have experienced in other frontier areas.

A lot would depend on whether there was litigation which attempted to slow down the process. That could affect the one year estimate. It could affect the seven year estimate. Let us assume, just for purposes of discussion, that it was not slowed by litigation.

If you have exploratory drilling taking place in the first, second, and the third years following a lease sale, and there is a strike fairly early on, you can push toward the early end of that period, the early end of that seven years.

If it turns out that you do not find anything for the first or second year of drilling, obviously you are going to slow down.

Suppose you find something in the first or second year. A development plan then has to be approved, at least on the OCS model. We do not simply say, go forth and do whatever you think is necessary to develop. We then require that the development drilling be accommodated to the wildlife interests, and that the development plan and the production plan be acceptable.

That takes a period of time, usually subject to public comment. Let us again assume no litigation, for purposes of discussion at least. Then there is development that takes place and there would have to be some kind of transportation system for the transport of the oil discovered in the area.

Constructing that might take another two to four years, depending on the difficulties of getting approvals for a pipeline. I would assume that there would be a pipeline from this area to the trans-Alaska pipeline system somewhere near Prudhoe Bay.

Senator BINGAMAN. So I guess what you are saying is that if things went as well as could be hoped for from your point of view, there would be some actual benefit in the sense of oil flowing to market at about 1997, 1998, that time frame, that you would begin to see some?

Secretary HODEL. Roughly some time after 1995, and I think that would certainly be along the lines of what you have indicated.

Senator BINGAMAN. I guess you suggested that we face a serious drop in production today and then, as I understand your comments, you implied that that was a result of lack of producible oil that we presently have.

My impression is that the significant drop that we have seen in the last year or so and that we continue to see is more a function of price than anything else at this stage. I would be interested in knowing what your expectations are with regard to price in your forecasts as to the demand for this oil.

Secretary HODEL. The larger share of the current drop in production, I think, has been a direct result of price, as you indicate. Unfortunately, the loss of some of that production is probably permanent.

I know you have a number of stripper well producers in your State, and I am sure you are familiar with the fact that, as they shut in those wells, some of them will simply not be returnable. Therefore we are losing some of the previously established reserves of the country.

In addition, and probably more significant over the longer haul for the country, there has been a sharp drop in the amount of exploration activity going on. It is clear that without exploration we are not going to find oil and gas, and without the find we do not have the development.

So, what is happening is that we are seeing a depletion in our reserves. There is a ratio of reserves to production. About 9 or 10 percent of reserves are produced per year. So as the reserves drop, the actual production drops.

That has tended to be fairly true, pretty much regardless of price. It makes sense that if somebody has a well that is producing, even if the price drops—and we saw this—they try to keep the well producing, because their cost of operation is fairly small. It is the drilling and exploration that is the high end.

We used, in estimating commercial viability in this area, a price figure, I think in the year 2000, of about $33 a barrel. We have also run other estimates.

Senator BINGAMAN. That is current dollars?

Secretary HODEL. That would be in current dollars, 1986 or 1987 dollars.

Senator BINGAMAN. 1984 dollars?

Secretary HODEL. 1984 dollars, excuse me.

Senator BINGAMAN. So as I understand what you are saying, you anticipate a significant increase in the price of oil worldwide in order for this to be economically feasible?

Secretary HODEL. I do anticipate a significant increase, yes. What I anticipate is far less important than what the people who are being called upon to invest or risk tens of millions of dollars in exploration up there anticipate. I think we would find a substantial interest on the part of potential oil producers, because of their anticipation of increased prices in the nineties, which would make $33 a barrel not unreasonable as a target price.

Senator BINGAMAN. Let me just ask one other item, and I think I know your answer on this. But the report that you have done really does not try to make a comparison between the cost of this oil as produced, comparing that to alternative energy sources or energy conservation or benefits from increased energy efficiency.

Is it your position that we are going to need them all? Is that what I understood you to say earlier, in response to Senator Wirth's comments? So that you think, if we can anticipate a price of $33, this is economically feasible and an appropriate thing to do regardless of the other efficiencies?

Secretary HODEL. Yes, that is correct. I think we will need them all. I think we will need more conservation. We will need renewables.

Incidentally, renewables do not usually offset oil, because generally renewables are brought into the energy system as electricity. They therefore do not tend to displace oil because very little oil is used in producing electricity.

But my view is—and I really think it is defensible in whatever depth we would like to go into it—that we will need all of the resources if we are to maintain a balanced supply and not place ourselves too much in the control of other suppliers.

Senator BINGAMAN. Let me ask one other thing if I could, Mr. Chairman.

Your expectation is in the year 2000, is that the price of oil in current dollars would be about $33, or you used that for purposes of your calculation?

Secretary HODEL. That is correct. It was used for the calculations.

Senator BINGAMAN. Did you also make a calculation as to the percent of oil used in this country that would be imported as of the year 2000 in that report?

Secretary HODEL. We did not independently do that. We referred to or knew of the pending energy security report from the Department of Energy, which also provides a range of possible scenarios depending partly on price estimates that are used.

Senator BINGAMAN. That is all I have, Mr. Chairman. Thank you.

The CHAIRMAN. Thank you, Senator Bingaman.

I have a statement here from Senator McClure, who is unavoidably at the Iran hearings this morning, which I will put in the record.

Also a statement from Senator Metzenbaum.

[The prepared statements of Senator Metzenbaum and Senator McClure follow:]

U.S. Senator Howard M.
METZENBAUM
of Ohio

Committees:
Judiciary
Labor and Human Resources
Energy and Natural Resources
Select Committee on Intelligence

Chairmanships:
Subcommittee on Antitrust
Subcommittee on Labor
Subcommittee on Energy
Regulation and Conservation

STATEMENT FOR THE RECORD BY SENATOR HOWARD M. METZENBAUM
ON RECOMMENDATIONS FOR LEASING IN ARTIC NATIONAL WILDLIFE REFUGE
BEFORE SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
JUNE 2, 1987

MR. CHAIRMAN, I APPRECIATE THIS OPPORTUNITY TO SUBMIT REMARKS FOR THE RECORD OF THE HEARING ON THE ARTIC NATIONAL WILDLIFE REFUGE. I BELIEVE THAT CONGRESS MUST VERY CAREFULLY DELIBERATE THE ULTIMATE FATE OF THE REFUGE. THIS COMMITTEE ON ENERGY AND NATURAL RESOURCES FACES A HEAVY RESPONSIBILITY IN MAKING RECOMMENDATIONS TO THE FULL SENATE ON WHETHER ANWR SHOULD BE OPENED FOR OIL AND GAS DEVELOPMENT, OR PROTECTED AS A WILDERNESS AREA. I BELIEVE THAT THE BURDEN OF PROOF LIES WITH THOSE WHO WOULD ALLOW DEVELOPMENT IN THE REFUGE.

INDEED, THIS REFUGE CONSTITUTES ONE OF THE LAST REMAINING UNDISTURBED ECOSYSTEMS IN NORTH AMERICA, AND FOR THAT MATTER, IN THE WORLD. ALASKA IS, AS MANY HAVE NOTED, AMERICA'S LAST CHANCE TO DO THINGS RIGHT -- TO CONSIDER THE LONG-TERM CONSEQUENCES OF DEVELOPMENT ACTIVITIES IN LIGHT OF KNOWLEDGE GLEANED FROM PAST EXPERIENCES. IF IN MANAGING OUR PRECIOUS PUBLIC LANDS WE FAIL TO APPLY THE LESSONS WE HAVE LEARNED OVER THE YEARS, WE DO OURSELVES AND FUTURE GENERATIONS A GRAVE INJUSTICE.

I FULLY APPRECIATE THE IMPORTANCE OF MAINTAINING THIS COUNTRY'S INDEPENDENCE FROM OTHER OIL PRODUCING NATIONS, PARTICULARLY FOLLOWING THE RECENT TRAGEDY IN THE PERSIAN GULF. THERE ARE, HOWEVER, A NUMBER OF WAYS IN WHICH THE UNITED STATES CAN PRESENTLY ACCOMPLISH THIS, THE LEAST OF WHICH IS NOT ENACTING AND ENFORCING PROVEN ENERGY EFFICIENCY STANDARDS, AMONG OTHERS. FURTHERMORE, RESEARCH INTO ALTERNATIVE ENERGY SOURCES MAY WELL REDUCE OUR RELIANCE ON OIL AND GAS IN THE FUTURE.

I AM SOMEWHAT SCEPTICAL OF THE ARGUMENTS MADE BY THE OIL COMPANIES AND THE ADMINISTRATION THAT DOMESTIC OIL SUPPLIES ARE WEARING DANGEROUSLY THIN, CREATING A PRESSING NEED FOR EARLY EXPLORATION AND DEVELOPMENT OF ANWR. I UNDERSTAND THAT OIL AND GAS RESERVES ACROSS THE NATION, WHICH HAVE ALREADY BEEN EXPLORED AND ARE KNOWN TO CONTAIN TREMENDOUS RECOVERABLE POTENTIAL, NOW SIT IDLE.

TO CITE JUST ONE EXAMPLE, A REPORT ISSUED THIS YEAR BY THE ALASKA DEPARTMENT OF NATURAL RESOURCES ESTIMATES THAT THE WEST SAK RESEVOIR IN ALASKA, OPERATED BY ARCO AND CONOCO, CONTAINS RESERVES OF 20 BILLION BARRELS, APPROXIMATELY TWICE THE PRODUCTION CAPACITY OF PRUDHOE BAY.

YET THE INDUSTRY AND THE ADMINISTRATION FLAUNT ANWR AS THE NATION'S LAST AND ONLY REMAINING RESERVE AFTER PRUDHOE BAY IS DEPLETED. IT APPEARS THAT WHILE THE OIL INDUSTRY ALREADY HAS ACCESS TO ALMOST ALL OF THE NATION'S KNOWN AND POTENTIAL RESERVES, IT WILL STOP SHORT OF NOTHING LESS ALL.

MOREOVER, THE DEPICTION BY MANY OF A CLEAN OPERATION AT PRUDHOE BAY IS WROUGHT WITH DISCREPANCIES. ACCORDING TO THE ALASKA COALITION, 953 OIL SPILLS, TOTALLING MORE THAN 193,000 GALLONS, WERE REPORTED AT PRUDHOE IN 1985 AND 1986. SINCE 1973, MORE THAN 17,000 SPILLS HAVE BEEN REPORTED, NOT TO MENTION THOSE THAT MAY GO UNREPORTED. IN 1983, 10,000 PARTIALLY FILLED BARRELS OF HAZARDOUS WASTES WERE SPILLED AT PRUDHOE BAY IN A SINGLE INCIDENT. AIR POLLUTION HAS BEEN RAMPANT, ALTHOUGH NEITHER DOI NOR EPA HAVE CONDUCTED ADEQUATE MONITORING PROGRAMS, ACCORDING TO THEIR OWN ADMISSIONS.

FINALLY, I AM VERY CONCERNED ABOUT THE ONGOING NEGOTIATIONS BETWEEN THE DEPARTMENT OF INTERIOR AND NATIVE CORPORATIONS OVER POSSIBLE LAND EXCHANGES BETWEEN NATIVE INHOLDINGS IN OTHER CONSERVATION SYSTEM UNITS IN ALASKA, AND SUBSURFACE RIGHTS TO PORTIONS OF ANWR. I BELIEVE THAT BY MERELY PURSUING SUCH NEGOTIATIONS, THE ADMINISTRATION IS PREJUDICING THE DEBATE IN FAVOR OF DEVELOPMENT.

MOREOVER, THE EXECUTION OF ANY SUCH EXCHANGE AGREEMENTS WOULD COST THE TREASURY AND THE AMERICAN TAXPAYERS, AND THE STATE OF ALASKA, ANY POTENTIAL ROYALTIES ON LANDS TRADED AWAY TO NATIVE CORPORATIONS. EVEN SO, IT DOES NOT APPEAR THAT ANY PRECISE SYSTEM EXISTS FOR VALUATING THE SUBSURFACE ESTATE INSIDE ANWR, DIMINISHING THE POSSIBILITY THAT ANY AGREEMENTS WILL BE FAIR TO EITHER THE NATIVE CORPORATIONS OR FEDERAL GOVERNMENT.

UNLIKE MANY OF THE CHOICES WHICH CONGRESS MAKES, THE DECISION TO OPEN ANWR FOR DEVELOPMENT WOULD BE A PERMANENT, IRREVERSIBLE DECISION. NO MATTER WHAT THE PROPONENTS OF THAT DECISION MAY SAY, THE SCARS OF DEVELOPMENT ON NATURE'S TERRAIN AND WILDLIFE WILL NEVER ENTIRELY DISAPPEAR. CONTRARY TO THE PICTURE PAINTED BY DEVELOPMENT ADVOCATES OF A BARREN WASTELAND, THE ARTIC COASTAL PLAIN IS IN FACT OVERWHELMINGLY ABUNDANT WITH PLANT AND ANIMAL LIFE.

BEFORE MANKIND LEAVES ITS IMPRINT ON THIS FRAGILE COASTAL PLAIN, WE MUST BE SURE THAT NO REASONABLE ALTERNATIVES EXIST FOR MEETING AMERICA'S ENERGY NEEDS NOW AND INTO THE FUTURE. I LOOK FORWARD TO REVIEWING THE TESTIMONY GIVEN DURING THESE FOUR DAYS OF HEARINGS.

STATEMENT OF JAMES A. McCLURE,
A SENATOR FROM IDAHO
BEFORE THE COMMITTEE ON ENERGY AND NATURAL RESOURCES
OVERSIGHT HEARING
JUNE 2, 1987

Mr. Chairman, most people agree that the national interest requires both the develoment of domestic energy supplies and the conservation of wildlife resources and rare and pristine natural environments. Unfortunately, the two goals often seem to collide. For example, how do we strike a balance in the Arctic National Wildlife Refuge, remembering that a wildlife refuge is created to preserve the wildlife, not exclusively to maintain the status quo of natural conditions?

It is important to keep in mind this reason for which wildlife refuges are created so that we can keep foremost in our minds that the wildlife species, including the natural fauna and biota, be protected to the maximum extent possible. We need also to keep in mind that current law and practice do permit other non-competing activities to occur simultaneously on wildlife refuges. Specifically, and to the point, oil and gas exploration has been permitted in other wildlife refuges across the country.

The Audubon Society acquired lands for the Rainey Wildlife Refuge in Abbeville, La. and had permitted exploration within that refuge in order to create money for other preservation work. They struck a balance that has worked.

Some biologists of the United States Fish and Wildlife Service, as well as Canadian and various private biologists, say the environment in the Arctic National Wildlife Refuge is unlike that of other refuges, that survival in it is difficult and that the migratory Porcupine caribou herd particularly might suffer. They question whether oil production is compatible with preserving that wildlife.

I am firmly convinced that the answer to this question is an unequivocal yes. The same sort of comments suggesting a threat to wildlife were made with respect to Prudhoe Bay development during the early 1970's. Yet the caribou herd at Prudhoe Bay has increased dramatically since that time. Some biologists in fact believe development of the Prudhoe infrastructure is in part responsible for this growth of the herd.

Then there is the argument that going after oil in such a sensitive frontier area is a "Drain America First" policy that will use up the nation's remaining onshore resources and lead to dependency later on?

Dependence isn't just a possibility for our future, it is an immediate reality. We are still recovering from the economic chaos caused by the 1973 oil embargo and the 1979 marginal shortage of oil imports.

We don't have to speculate. While the world is in generally better economic condition today than it was in 1973 and 1979, we're rapidly approaching the position where we again will have free-world vulnerability to the economic effects of a marginal shortage of an essential commodity.

Critics of leasing at ANWR add that the Administration is ignoring other possibilities, such as developing alternative fuels, and that we are going into the wildlife refuge when we could save equivalent amounts of oil as believed to be at ANWR, simply by driving slowly and making our appliances more efficient.

A balanced energy policy is absolutely essential, and that does mean conservation and it does mean alternative fuels. But it also means that we must recognize the competitive nature of the world, and that competition involves the economics of production. This means we cannot, in the United States, pay a price for the production of goods that is disproportionate to that which is paid in other countries. When we do, we obviously will lose our economic competitiveness. All the alternatives to the prouduction of economic oil resources, such as ANWR, have to meet a test not only of technology but of economics.

We also hear critics say: "Don't drill that oil, burn our coal." Those same critics also point out we have an acid rain problem and a whole host of other problems--real or perceived--

associated with the burning of our plentiful coal resources. Coal is and shall remain an integral part of our energy future, but we shouldn't automatically assume that since we're the OPEC of coal we can automatically shift to the combustion of coal.

Mr. Chairman, I am absolutely convinced we need to develop the Arctic National Wildlife Refuge for domestic energy security reasons, but I am equally convinced we can do so in a responsible, deliberate, and environmentally sound manner. Wildlife and environmental resources can and must be preserved at the same time development occurs--I don't believe any of us would want it any other way.

Mr. Chairman, I look forward to working with you in reaching a responsible solution to the development of ANWR and I appreciate these hearings. I would urge that we maintain a schedule in Committee that leads to a wise decision to achieve the balance of these national objectives at the earliest time possible.

The CHAIRMAN. Senator Wirth.

Senator WIRTH. Thank you, Mr. Chairman.

And Secretary Hodel, thank you very much for coming up today. I look forward to an interesting morning.

Before we get into ANWR, let me follow up on a request that I made of your office last week, that you provide to us a clarification of your statement on stratospheric ozone. I noticed you did not come equipped this morning with dark glasses and suntan lotion, and I was wondering if you could please provide to the Congress and to the country a clarification of whatever statement you did make. Could you do that?

Secretary HODEL. I will happily do that. In fact, if you would permit it, I would like to respond briefly at this moment.

Senator WIRTH. If that is all right, Mr. Chairman. I know that is not the subject of this particular hearing, but I think this would be an appropriate time to do so.

Secretary HODEL. I would appreciate it. May I say, Senator, I appreciate your statement in the Congressional Record, in which you expressed shock and dismay at what allegedly I had said, because you did say, if it is true.

Senator WIRTH. On a number of occasions, Mr. Secretary, on a number of occasions. There have been other statements that were true that have shocked and horrified me, I will admit. [Laughter.]

Senator WIRTH. I do not know about this one yet.

Secretary HODEL. Well, I do not think it is true——

Senator WIRTH. Well, you ought to know whether or not it is true.

Secretary HODEL [continuing]. That either represents what I said or what my position is. Let me just set the scene briefly.

In the course of discussions of a proposed agreement internationally on chlorofluorocarbons, CFC's, it seemed to me that there was a substantial pressure to go forward with an agreement without providing the President adequate options as to what that agreement should contain.

The point is, our concerns are based to a great extent on health and safety consideration. We have seen a significant increase in melanomas, skin cancer, largely we think from exposure to rays of the sun. What we have learned is that a lot of that took place at a time when we had not seen the depletion of the ozone layer that we are now beginning to see.

We think we are now seeing a depletion of the ozone layer and we think it may be caused by CFC's to a substantial extent. The position of the Department of the Interior in Switzerland at the most recent international meeting was not that there should be no such agreement, but that the agreement we enter into should be one that will accomplish its objectives.

Specifically, there needs to be a sufficient number of signatories to the agreement, and a sufficient number of the chemicals included within the agreement so that we could expect it to have some impact. My concern has been that there appeared to be—I cannot say that it in fact was their intention, but it appeared to be—a possible intention on the part of some people to move so quickly to a signing that they appeared to be willing to advocate too few countries and too few chemicals.

Well, in the course of carrying on that discussion and debate, obviously someone in the Cabinet Council meeting was not very happy with my derailing the train, or attempting to. In the story that appeared first, it was written in such a way, although it did not really put those words in my mouth, that it appeared that I had somehow suggested that the solution was simply sunglasses and hats.

I did not at any time suggest that that was the solution. Let me say, in addition to an agreement internationally, we need to continue to support the American Cancer Society's efforts to cause people to be concerned about the levels and extent of their exposure to the sun. Whether or not there is an ozone depletion problem, we are seeing a substantial increase that ought to be headed off.

Senator WIRTH. Well, Mr. Secretary, I hope that you would provide to us, as we requested, the analysis and statement of the Interior Department. Will you be willing to do that?

Secretary HODEL. Yes, I will.

Senator WIRTH. And second, I hope that, as you stated this morning, the efforts of the Interior Department, to use your words, to derail the train, that you would explain to us what you mean by derailing the train?

Secretary HODEL. By derailing the train I mean that I do not think we ought to enter into an international agreement that does not accomplish the intended purpose. In other words, we ought not to enter into an international agreement that only includes a few countries producing or using CFC's.

We should not enter into an agreement that only includes two, instead of six, CFC's.

Senator WIRTH. I understand. Could you provide us your own analysis of the agreement that had been reached by the State Department and other countries?

Secretary HODEL. No agreement has been reached.

Senator WIRTH. Or recommended agreement that was developed from the meetings in Geneva?

Mr. Secretary, if I might, we look forward to receiving that. I hope you might be able to send it up to us right away.

Secretary HODEL. I will have to be sure that I have the authority to transmit documents which have been in the control of the State Department, the Environmental Protection Agency. To the extent I have the authority and the ability to do so, I will transmit them.

Senator WIRTH. But if you do not, will you tell us who does when you submit those? That would be helpful.

Secretary HODEL. Yes, I will.

Senator WIRTH. Thank you very much, Mr. Secretary.

You noted in your opening remarks that the overall policy of the Department of the Interior on energy was "to provide an adequate supply of energy at a reasonable cost." That is the statement of your policy, is that correct?

Secretary HODEL. That is the statement of the national energy policy plan, which was produced and received presidential approval and submitted to the Congress in the spring of 1983.

Senator WIRTH. You then went on to point out that you are pursuing a variety of initiatives, and you listed a lot of those, to achieve the goal of our national energy policy. You included in that list the pursuit of an aggressive conservation strategy. Is that a fair summary of that part of your statement?

Secretary HODEL. What I intended to say was that we carried on research activities on conservation and renewables. What I said when I was Secretary of Energy time and again was that the most difficult thing I had to do was to maintain momentum for renewables and conservation at a time when there was a perceived energy glut.

Senator WIRTH. Can you tell us what has happened to the conservation budget under this Administration? Can you give us just the numbers from 1981 to 1988?

Secretary HODEL. I cannot give you the current figures.

Senator WIRTH. Well, I can give them to you. The fiscal year 1981 budget allocated $817 million to research on conservation and state grants, when this Administration came into office. The President's budget request for this next fiscal year was $86 million, or a cut of some 91 percent in the conservation budget.

Perhaps, on the conservation area as well, could you review with us this Administration's record on automobile efficiency standards?

Secretary HODEL. In the case of automobile efficiency standards, there is, as you know, a fair dispute over the effectiveness of such standards. It is our view that the standards have had very little, if any, effect on automobile mileage efficiency. In fact, the evaluation is that during the early years of the automobile efficiency standards, each year the fleet efficiency exceeded the standards required by CAFE standards.

That was a result of increasing gasoline prices and consumer action demanding a more fuel-efficient automobile. The import experience of the United States showed that importers were providing that and consumers were moving toward it, and Detroit responded.

Senator WIRTH. Let me repeat the question if I might, Mr. Secretary. Can you review for us what the Administration has done on automobile efficiency standards?

I can tell you what has occurred. The Administration has rolled back the fuel efficiency standards for automobiles, and proposed a repeal of the law. I do not know where there is debate on whether or not fuel efficiency standards save gasoline. I suspect that probably about 99 percent of all those who have taken economics 101 would concede that if you have more efficient automobiles you are going to use less gasoline.

CRS has estimated—and let me point this out for the record—in a recent study which I will be happy to send down to your analysts, CRS has estimated that the rollback recommended and implemented by this Administration, by Secretary Dole, will increase oil demand, just this step alone, this administrative step alone by Secretary Dole at the Department of Transportation, will increase oil demand by some 400,000 barrels per day.

And that, Mr. Secretary, is the equivalent of 20 percent of Alaska's current production. One administrative step alone by this Administration, by this Secretary of Transportation, has eaten up the equivalent of 20 percent of the oil production of Alaska alone.

Let me also point out that, of our total oil requirements, some 63 percent of that is used in the transportation sector. If that is the case, then that would further suggest, it seems to me, that we ought to be pursuing energy conservation if in fact there is a national emergency, as you were suggesting in your opening remarks.

And as Secretary Herrington has suggested, if there is an emergency what we ought to be doing is focusing the federal government's attention on the issue of conservation in the transportation sector, rather than going in just the opposite direction.

Now, I have difficulty understanding how this is part and parcel of a comprehensive energy strategy, and one in which you say you have pursued an aggressive conservation strategy.

Secretary HODEL. I think, Senator, that the conclusion that this represents 400,000 barrels a day is the conclusion of one analysis, using certain assumptions with regard to price, projected availability of supply, and the like.

Senator WIRTH. Have you responded publicly to that analysis? Has Interior done that?

Secretary HODEL. I have not. This is an area that I have not pursued in detail personally as Secretary of the Interior. It is a Department of Transportation and a Department of Energy situation.

But what I would like to do if I might——

Secretary WIRTH. If I might, Mr. Secretary, that is the whole point, there has to be a comprehensive overall approach. And it seems to me that before we in the Congress ought to be moving into an area that is as fragile as this, that is as unique as this, that has the enormous potential of this area, that we, on behalf of the American people, ought to receive a comprehensive analysis as to why this is necessary.

Now as I understand it, you are telling me that Interior really does not know what the Department of Energy may be doing in terms of its approach to energy conservation. CRS has prepared a very clear analysis as to what the Department of Transportation is doing in terms of a dramatic change in our energy consumption in this country.

And I do believe, as I pointed out in my opening statement and have said on any number of occasions related to this issue, that we must have an understanding of the overall energy policy that this Administration believes the country ought to be pursuing before we move into making a decision, a decision as far-reaching as I believe this one is.

Secretary HODEL. If I may, what I would like to do in order to respond to that question is to provide you with an analysis. I do not have available to me the analysis of the Department of Transportation and the Department of Energy in this area.

Let me say, I believe I understand where the Department of Energy is coming from, having familiarity generally with their energy security report. Let us say that, if the 400,000 barrels a day figure were irrefutable, it still does not alter the need for replacement of the depleting oil reserves that we have.

In fact, if anything, what this suggests is that those of you who feel the Administration is not aggressive enough in the conservation area should be demanding that we move more aggressively to explore for the oil that in your view, through our lack of activity, is going to be needed. In other words——

Senator WIRTH. Mr. Secretary, I do not just believe that we ought to be more aggressive in conservation; I think we ought to be more aggressive in coal gasification and liquefaction and looking at the alternatives in oil shale and looking at the pricing issues that Senator Bingaman was mentioning, in looking at solar energy.

I think there is a whole set of agendas that have been neglected by this Administration, that Secretary Herrington effectively admitted was the case when he came up here the other day and laid out for us the Administration's energy analysis, which effectively said, if we got rid of the windfall profits tax, everything was fine.

Secretary HODEL. Let me say, I know Secretary Herrington well enough——

Senator WIRTH. He is a very good witness, as you know.

Secretary HODEL. You are probably not totally fairly characterizing his testimony, saying that getting rid of the windfall profits tax solves all problems in energy. But let me suggest——

Senator WIRTH. I will send you a copy of that transcript as well. It will keep you awake.

Secretary HODEL. We may have to exchange documents here.

Let me just respond to the overall question that you have raised. First of all, when we came in as an Administration, we found in the area of conservation substantial expenditures for activities which we deemed to be unproductive.

I was not Secretary of Energy at that time, but Secretary Edwards cut back dramatically on the demonstration projects, which we have found are very expensive and generally not very productive when the Federal Government gets into it. One that we did not cut back, one that we went forward with, was the coal gasification plant in North Dakota, which as some of you know has proven to be economically non-competitive with natural gas.

It has been run in order to learn something in the way of the operation. $2 billion has been expended to build that plant, and it turns out that it is not productive.

Very large sums of money are consumed in installation, and in actually building a plant to produce something. Very small sums of money, relatively speaking, can be spent at the frontier of technology trying to find a way to reduce the price and the cost. That was the strategy that we employed while I was Secretary of Energy.

We tried not to spend money on large demonstration projects, believing that if we could prove it in the laboratory there is a tremendous incentive on the part of individuals to take it from the lab into the commercial sector.

Senator WIRTH. Mr. Secretary, I thank you.

On this front, I know my time has more than expired. Mr. Chairman, I appreciate your generosity and that of the other members of the Committee, and look forward to a second round. Thank you, Mr. Chairman.

Thank you, Mr. Secretary.

The CHAIRMAN. Senator Ford.

Senator FORD. Thank you, Mr. Chairman. I will not take but just a minute to ask three or four questions.

Senator Wirth indicated relaxation of the CAFE standards. He left out SPRO. We are not moving in that direction. You find all the funding basically that this Administration wants for clean coal technology and others will probably be after they leave office, and leave it up to others to do.

It has me worried considerably. If we keep on the same track we are today as it relates to consumption of oil, domestic production and imports, by the year 1995 what is your guesstimate that our imports will be?

Secretary **Hodel**. The Department of Energy study indicates that they will exceed 50 percent. My view is that if there is any kind of a price break this year that will further exacerbate it, we could hit 50 percent well before that.

Senator **Ford**. So then, bringing on line the 1002 lands soon would probably come about the time we hit the 50 percent mark?

Do we not have something going to the President that says when we reach 50 percent he is supposed to notify us?

The **Chairman**. Senator Bentsen's bill.

Senator **Ford**. Senator Bentsen's bill.

If you go back to CAFE standards that were initiated by Congress, they were not initiated by the automobile industry in order to bring them on line to be in competition with fuel efficiency, I am a little bit concerned about all the ads on TV: America is back.

They are back to putting their name on a Japanese automobile. That is about all they are back in, and people that flaunt that in our face and wave the flag at us are the biggest abusers of the import of foreign automobiles.

In your statement, Mr. Secretary, on page 6, you talk about the Porcupine caribou herd and, including the upper—is it Jago River?

Secretary **Hodel**. Jago, yes.

Senator **Ford**. Is there any way to exclude that 84,000 acres, which is less than six percent of the 1002 area?

Secretary **Hodel**. The way, of course, is the Congress could simply say it is excluded. We would hope fervently that they would not do that because that area is thought to contain perhaps as much as 25 percent of the potential in the 1002 area.

Senator **Ford**. I mean, that is just an idea that you throw out to try to work it out. I would like to act, for a change, rather than we normally do around this place, and that is react to over 50 percent. We will be beating our chest and pounding the table and doing a soft-shoe and everything else because we are over 50 percent imports. And I would like to get on board so we can say we acted, rather than reacted.

So it is my understanding that there is not a real problem as it relates to this herd under the circumstances. Let me also ask you, what kind of development is in place or contemplated on the Canadian side?

This herd goes over into Canada, I understand, and winters, and I just wonder what is beyond our border? What is there that might, say, be significant to the 1002 lands?

Secretary **Hodel**. Let me begin the answer, and I hope Secretary Horn can expand upon it. Immediately east of the Canadian border adjacent to the area, there is a three million acre Canadian national park. That is, to put that in perspective, about twice the size of the 1002 lands as marked on this map.

Then, in the caribou area there has been drilling, and I understand there is one area where there is some production, but I am not sure of that. This is in the Canadian area outside their national park, of course.

There was drilling in the national park area prior to it becoming a national park and it did not find producible oil.

Then there is the Dempster Highway that passes through there. There is Canadian development off the shore in the Beaufort Sea.

And perhaps, Bill, you may want to expand upon that.

Mr. HORN. I think the Secretary has covered it. Most of the present Canadian activity is in the area at the MacKenzie Delta and the offshore region. They do have this three million acre park right up there in their northwest corner adjacent to our unit, which was created after they had done some exploratory drilling in that calving portion on their side of the border back in the early seventies.

Other than that, there really are no special land status arrangements in that portion of Canada.

Senator FORD. On page 12, if you want to, your negotiations with Canada, what negotiations are you having with them and at what stage is it?

Secretary HODEL. We are negotiating an agreement for the cooperation and coordination of our activities with regard to the Porcupine caribou herd. This has been in negotiation for some time.

We think we are very close to an agreement which we will be able to sign with the Canadians. That will provide an assured mechanism for them to comment and for us to comment to them in turn on activities that may have some impact on the caribou herd.

Senator FORD. That is the only negotiation you have, that if they do something as it relates to development they are to notify us, and whatever we do we are to notify them? Is that the only part of the negotiations you have?

Mr. HORN. The agreement, Mr. Chairman, would establish an international board with representatives from both sides. It would establish a formalized consultation and notification procedure. And it would set out some objectives, basically to have the countries work together to conserve this important wildlife resource.

It would formalize a process that has existed informally for many years. We work jointly with the Canadians on a whole realm of international wildlife issues and we just deem that this one is of sufficient importance that it is worthy of a particularized institutional arrangement to upgrade it from informal ad hoc to a very formalized process.

Senator FORD. Let me just kind of pin you down a little tighter. You thought there was some development in the eastern section. You were not quite sure that there was some production in the park, and it did not fare very well, and now up in an area—they are not southern names and I cannot pronounce them very well.

Senator MURKOWSKI. I will help you.

Senator FORD. I will call on the distinguished Senator from Alaska to help me a little bit.

Mr. HORN. Most of the present activity that looks like it will yield production—and indeed, the Canadians are talking about production in their section of the OCS—is essentially offshore in this area here and in the MacKenzie Delta region.

There has been drilling all the way over into this portion of Canada in the early seventies, when they conducted a very aggressive program. These produced dry holes, so it was after the dry holes that this area right here, this three million acres, became a Canadian park.

Most exploration and most of their current development activity are in here and over in this portion. You have the Dempster Highway located right here. This is the only significant human structure that the caribou encounter.

Senator FORD. Going east southeast.

Mr. HORN. Then they have to cross back over.

Senator FORD. One question. You showed where there was a potential for oil. Yet you only want to attempt the 1002 lands in the beginning. Does that limit? Say we authorize the—well, that is the total amount, I see.

The blue is the blowup of the 1002?

Secretary HODEL. Right.

Senator FORD. And that is the whole area of the red over here?

Secretary HODEL. That is correct.

Senator FORD. OK. Now, the KIC lands, is that where you want to start your first leasing?

Secretary HODEL. No, the KIC lands are Kaktovik Inupiat Corporation lands. Those are lands which the Native corporation owns but does not have a right to develop either, until there is some Congressional action.

We recommend that both the red area and the area in white on the map on the right or the larger area here and the KIC lands on the left should be included in legislation deciding that exploration should go forward.

And may I say——

Senator FORD. I am trying to figure out how you would sell the lease, authorize the lease, how we would take it step by step, how we could go a certain portion of the way and if it develops then we would go on, rather than open it all up and come forward with it.

I am torn between the need of oil for the future and conservation, very frankly, and I hope we all are.

Secretary HODEL. I understand that, Senator. We believe that the appropriate way to accommodate those two interests is to have a permitted leasing program which requires appropriate stipulations in the leases and appropriate monitoring as we proceed with leases. This monitoring would determine the impact of the specific activities and the potential cumulative impact, so that we do not put ourselves in the position where we in fact jeopardize those wildlife interests in the area.

Now, if the interest that is sought to be served is a wilderness interest, if the purpose is to prevent any activity from taking place there because of the impact of the presence of human beings and developmental or exploration activity, then obviously the fact that we can mitigate the effect on the wildlife is not going to satisfy the person whose position is that it ought to be wilderness.

Senator FORD. Well, Mr. Secretary, I hope you would not get swapping of lands or land swaps started in the beginning. I get a little frustrated, have been frustrated with that. So I would hope that you would not get into land swapping, and we will give you this and we will take that and that sort of thing.

That indoor record that we set with meetings when we established this up there, I do not want to go through that again.

Thank you, Mr. Chairman.

The **Chairman**. Thank you, Senator Ford.

Senator Conrad? He had to go preside.

Senator Domenici.

STATEMENT OF HON. PETE V. DOMENICI, A U.S. SENATOR FROM THE STATE OF NEW MEXICO

Senator **Domenici**. Thank you very much, Mr. Chairman.

I have a brief statement I would ask be made a part of the record.

[The prepared statement of Senator Domenici follows:]

STATEMENT OF
SENATOR PETE V. DOMENICI
ON THE ARCTIC NATIONAL WILDLIFE REFUGE

COMMITTEE ON ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

June 2, 1987

Mr. Chairman,

I am pleased that the Committee is holding hearings today on the future of the coastal plain of the Arctic National Wildlife Refuge.

The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) established 16 National Wildlife Refuges in Alaska. One of those refuges is the Arctic National Wildlife Refuge (ANWR). ANWR encompasses 19 million acres, approximately 8 million acres of which is designated as wilderness.

Section 1002(h) of ANILCA directed the Secretary of the Interior to:

(1) conduct biological and geological studies of the 1.5 million-acre coastal plain of ANWR;
(2) report the results of those studies to Congress; and
(3) recommend to Congress whether the coastal plain region should be made available for oil and gas exploration and development.

In April, the Secretary issued his report, recommending that the coastal plain of ANWR be opened to oil and gas leasing. However, under section 1003 of ANILCA, only Congress can authorize oil and gas leasing of the coastal plain.

Congress must now face the difficult decision of whether to open the coastal plain to oil and gas leasing. It must decide whether the potential economic and national security benefits of the development of ANWR's oil and gas resources outweighs the potential harm to the environment. If it does, Congress must determine what environmental safeguards should be established to assure that the development of the energy resources of the coastal plain does not destroy the environment of ANWR.

Mr. Chairman, I do not know the answers to these questions. I need to know more about the oil and gas potential of the coastal plain, the environmental effect of leasing, and the impact on national security and energy independence of any decision. This Committee must take the time to assemble all the information we can to assure that whatever decision is made is the right one.

I welcome these hearings today as a first step in the decision-making process. I appreciate your holding these hearings and look forward to the testimony.

Senator Domenici. Mr. Secretary, how many acres of Federal land in Alaska are currently closed to oil and gas leasing?

Secretary Hodel. Assistant Secretary Horn suggests to me that statutorily it is at least 75 million acres.

Senator Domenici. Well, what makes the Coastal Plain unique from the other Federal lands previously set aside in Alaska?

Secretary Hodel. Each area has its own attributes, of course. In this case, our recommendation clearly suggests that we do not think it is an area that is so unique that it can only be protected by wilderness designation. I am probably not able to answer your question in the affirmative as to why it is so unique, and otherwise not represented.

Senator Domenici. Well, if you fully lease this area, how many acres of land would be affected? Or to put it another way, what percent of the Coastal Plain does this represent?

Secretary Hodel. Just to put this in perspective, Senator, the blue and red areas combined on the right-hand map are about 19 million acres. That is the Arctic National Wildlife Refuge.

The red area, which is the only area under discussion here, the 1002 area, is 1.5 million acres or about 8 percent. In the event that oil was found of the magnitude we guesstimate through our computer modeling, we would be talking about actually physically occupying for roads, drill pads, pipeline, a total of 12,650 acres or less than one percent, about .8 percent of the 1002 area, a very small amount.

Now, I need in fairness to say that the major impact that we have identified in our report is that, in the event you do occupy the land with a road, with a pipeline, and with 23 drill pads of 20 some acres each, the caribou during that six to eight weeks they are in the vicinity during their calving and post calving period will avoid these areas by one to three kilometers.

So you have to draw a radius around those areas, which they presumably will not use for calving purposes, although we would anticipate that once they have calved they would move back to graze, if Prudhoe Bay is any indication.

Senator Domenici. So my next question was going to be, how many acres of roads, pipelines, airfields, ports, and the like. Have you just described that?

Secretary Hodel. That is the 12,650 acres.

Senator Domenici. And is that for exploratory or full development?

Secretary Hodel. That is in the case of what we have defined as full development. In the case of exploration, there would be very limited activity. In fact our judgment is that it would have negligible to no effect because we would require that the exploratory activities take place when the caribou are not in the vicinity, in the winter when the ground is solidly frozen, and to the extent possible on snowpack and the like, so that there is not even a mar or a mark that is visible in the spring.

Senator Domenici. Where are the concentrated calving areas for caribou on this Coastal Plain, and how many acres does that consist of? And might I ask, was serious consideration given to eliminating that calving area?

Secretary **Hodel**. There was serious discussion of doing so, Senator. However, the calving area, which is identified on the map (that has just been exhibited) by the red line, extends to about 8.9—call it 9—million acres. Then there is an area which is marked in darker red or pink on that map, which is the area that they generally find themselves in.

But they move through this area for calving purposes from time to time. They have, between 7 and 11 out of the last 15 years, been on some of this acreage in this upper Jago River area, but they have by no means been there every year.

So they have shown some willingness and ability to move throughout that area for whatever reason seems to move them.

Senator **Domenici**. So your answer is it would be difficult to do that, to exclude the calving area, because it is a moving target?

Secretary **Hodel**. If we were to try to exclude something that we said was "the" calving area, it would be impossible. But there are those who advocated, and we discussed at some length, the possibility of suggesting that those areas to which they have shown a greater preference should be excluded.

My judgment was that such exclusion was not necessary for the protection of the caribou herd, and that as long as we had some area up there with potentially enormous potential, there would be a constant drumfire of effort to expand and to extend into that area, so we would be better off to do it in an orderly fashion as part of an overall leasing program.

Senator **Domenici**. Well, Mr. Secretary, while I got here a little late, I asked the Chairman and he indicated to me that you did talk about the effect of Prudhoe Bay activities on caribou, did you not?

Secretary **Hodel**. I did.

Senator **Domenici**. Now, is there a relationship between the two areas that can cause that to be an experience that is relevant for the Congress, or is there something different about the two with reference to the caribou?

Secretary **Hodel**. There is no dispute that there is a very significant potential relationship between the two. But there is also no dispute that they are two separate caribou herds.

The central Arctic caribou herd, the one that has tripled in size since Prudhoe Bay went into place, is a separate caribou herd from the Porcupine Caribou Herd which uses the 1002 area.

Now, I think that, quite properly, our Fish and Wildlife biologists have been super-careful and have been unwilling to certify that in their opinion the excellent experience at Prudhoe is 100 percent transferable to the 1002 area.

However, I think you can look at the experience at Prudhoe, what we have learned there, and realize that if we proceed in an orderly and monitored, sensitive fashion, we have every reason to believe, by a very sizable margin of confidence, that we can proceed without adversely affecting the herd.

Senator **Domenici**. Now, Mr. Secretary, I think you quite properly, with reference to conservation and preservation, stated the issue. If this area is to have wilderness characteristics, obviously we cannot do any of the things that you recommend, regardless of how careful you want to be.

But let me ask, aside from the caribou herd which is special and distinct from that which was benefited, not harmed by our Prudhoe experience, what other environmental conditions and/or species of animal or wildlife are contended to be specific to this area and perhaps adversely affected, leaving aside for a moment wilderness preservation, which has its own general quality of preservation as is?

Secretary HODEL. I would like to ask Assistant Secretary Horn to expand on that if I may.

Senator DOMENICI. Could you do that quickly?

Mr. HORN. Yes. Mr. Chairman, we have six volumes of biological reports. The final report is nothing more than a synthesis of much of that work.

Other major species that use the area in whole or in part include the reintroduced muskoxen herd, snow geese, wolves, brown bears, and a host of migratory birds. The report concluded that in all circumstances, with the exception of the Porcupine Caribou Herd and the reintroduced muskoxen herd, full production would have moderate to negligible effects on all other wildlife values.

We have already discussed the Porcupine caribou herd. The only other animal with any projected prospective major effect as a result of production is the reintroduced muskoxen herd. Essentially, these animals were extirpated at the turn of the century. They have been reintroduced. There are roughly 500 of them in the area.

The major effect is, if portions of the land are occupied with roads and pipes, some expected level of displacement. That displacement in and of itself is considered to be a major effect. However, that displacement is not expected to cause any reduction in the herd's population. Indeed, all it is expected to do is slow down the herd's expansion rate.

That, in essence, is the major wildlife effect. In order to make sure that those projected effects are indeed minimal if the area is opened and developed, the report proposes the adoption of 29 very specific mitigation measures.

Senator DOMENICI. Mr. Secretary, I think you did not mention the polar bear. I understand that conservationists are discussing the polar bear. Is that correct?

Mr. HORN. There is some polar bear use of the coastal fringe of the 1002 area, but the report does not predict any major effects on polar bears as a result of development of the three billion barrels of oil in this area.

Senator DOMENICI. You will get your turn shortly, Senator. You know a lot more about it than I do, so you can talk about the polar bears.

Let me ask one last question. Mr. Secretary, I understand that we have had a rather poor experience in the past when we had an area that we wanted to explore and the Federal Government did the exploring, or even contracted for the exploring, and then contemplated thereafter that we would go with the private initiative.

But do I understand in this case that your proposal is that, even if oil is found, there is a certain development scheme that would be followed so as to minimize damage to the environment and the species there? And is that done in advance or is that done as the condition for further exploration once the oil or gas is found?

Secretary **Hodel**. In prior situations which I think are comparable—in the OCS for instance—we have gone through an extended process leading up to permitting exploration.

Exploration is then carried out pursuant to stipulations and requirements relating to the protection of various interests that may be affected. If resources are found during exploration, then the company has to file a development plan, which has to be approved by the Department.

The development plan will include stipulations with regard to how many people are in the area and when they are there. For instance, there was a well drilled on the Native lands in the area for exploratory, geological purposes, not for production purposes. When I visited that site, the derrick was laid over.

Whenever it was not in use, the derrick was laid over so that, in the event of fog or whiteout conditions, birds would not fly into it and be killed.

That is the kind of thing that you require in order to minimize, to the barest possible minimum, any possible effect.

Senator **Domenici**. Mr. Chairman, I have a list of maybe ten or twelve more specific questions. I will submit them for the record.

How long are you going to leave the record open for the Secretary? Ten days?

The **Chairman**. Let us leave it open two weeks.

Senator **Domenici**. I will submit these, Mr. Secretary, for your review.

Thank you, Mr. Chairman.

STATEMENT OF HON. FRANK H. MURKOWSKI, A U.S. SENATOR FROM THE STATE OF ALASKA

Senator **Murkowski**. Thank you, Mr. Chairman. I apologize for coming in late, but I brought this change of climate down from Alaska this morning and it kind of caught up at the Chicago airport.

So let me compliment you for scheduling these hearings. They are very important to our State of Alaska, and I think that in the manner in which you have set up your calendar you are certainly giving everyone and all interest groups an ideal opportunity to be heard, and I think that is most important.

I have a statement which I will submit for the record. I would just like to highlight some specific observations, and then I do have some questions.

I think one of the major concerns here is determining whether and in what manner oil and gas leasing should be permitted on the Coastal Plain of ANWR, and it really is a paramount energy issue that the Senate will be addressing this Congress. I would like to emphasize that it is an energy issue and it is appropriate that it be in this Committee because it is not an environmental issue, as some would, I think, prefer to characterize it.

Opening ANWR really gives us the chance to make decisions based on facts. I noted, Mr. Chairman, in observing the manner in which the testimony was received and the questions from the members that this is a broad oversight hearing, covering everything from the economics of synthetic fuels to the ozone layers.

And I commend you, Mr. Secretary, for your ability to articulate in such a broad area, when undoubtedly you were prepared to come up here pretty much on ANWR. But I think it cites your capabilities in the area of energy and related activities.

It is also, I think, apparent that there seems to be an assumption prevailing that there is oil there. You usually do not find oil when you go look for it, and we have had other occasions in Alaska associated with areas surrounding Prudhoe Bay that promised great rewards and great returns, and a great amount of money has been invested and they have turned up dry.

And there is a reasonable chance that this will occur if indeed the 1.5 million acres is leased. So I think it is important to recognize that until we in fact find oil here, we are debating the merits of those that explore for oil and usually do not find it.

I think, too, that the oil industry's record of environmentally sound operations at Prudhoe Bay, the Kuparuk Field, Endicott, Lisburne, as well as the unsuccessful effort in the Naval Petroleum Reserve, provides a proper context for an examination of the ANWR Coastal Plain issue, because we have learned a lot, as cited by your particular report.

So in the ANWR debate I think, Mr. Chairman, it is a bogus question to ask, shall we sacrifice the environment of the Coastal Plain for a few months supply of crude oil. I think the relevant question should be, are we willing to accept a possible compromise to the Coastal Plain's wild and natural state in exchange for the opportunities to explore and develop the oil and gas reserves that may be there.

And as you and I both know, if you are fortunate enough to find oil in Alaska, that is not good enough. You better find a lot of it, because the economics are going to dictate whether you can afford to bring it out.

My answer, Mr. Chairman, as you are well aware, is that we should proceed. There are already more than 57 million acres of designated wilderness in Alaska, and in ANWR itself over 40 percent of the 18 million acre refuge, or 8 million acres, is wilderness.

On the other hand, the 1.5 million acre Coastal Plain is the most promising onshore unexplored oil and gas prospect left in America, as cited in your report.

I think, for the benefit of my colleagues, there should be some reference as to just how this can be kept in a perspective that can be understood. In the wildlife refuges in Alaska there are 53 million acres, 53,720,000. In the national parks and monuments there are 48,325,000. In the national forests there are 23,298,000.

And the area totally designated as wilderness is 56,276,000. It is my understanding, if my arithmetic is correct, that this adds up to roughly 200 million acres, of which half of that would be prohibited from any drilling, approximately 100 million acres.

I am told also that, if Alaska's 55 million acres of designated wilderness were made into one state, it would be the eleventh largest state in the Union. And I think these examples put this argument into perspective of just what we are talking about.

ANWR currently equals the size of Maine or the size of South Carolina. So I think as we reflect on what we are talking about here, we are talking about opening up 1.5 million acres for exploration. If indeed oil was found on all the acres proposed for lease, there would be about 12,000 acres utilized.

And I think also I would ask permission of the Chairman to include in the record a report by a Dr. Bergerud, who is a Canadian biologist who has lived on the caribou plains of North America and Europe for about 22 to 26 years. And he has made some very interesting observations, including the realization that the caribou is a very versatile animal.

When the Porcupine herd moves across that vast area and into Alaska to calve, the males do not necessarily go with the females. The males peel off prior to the area where they move out to the Coastal Plain and they feed there during the summer.

The females move out in the bleak Coastal Plain to calf because there are no predators. That is why they are out there. It is not because it is such a great place to get out of the wind or the mosquitoes. There is simply no cover for predators.

And he puts this into a perspective that I think answers the question associated with, well, why, when we have apparently a designated area can we not exclude that designated area and proceed with leasing? The realities are that the caribou move in any given area.

And I think the fact that we have in the record the experience of Prudhoe Bay, where in 1972, it has been cited already in the hearing, that there were some 3500 animals, today there are 14,000 animals. One can safely say that those animals have grown up around some level of activity—a road, a pipeline, a modest amount.

So you know, this is evidence that we can have a compatibility of exploration and, if fortunate enough to find oil and the economics support it, production as well. So these are facts that we live with in Alaska and we understand.

We have a tremendous concern and conviction to maintain the lifestyle and the environment and the ecology, and we think we have done a good job, as a matter of fact a better job than any other state. And we continue to learn by the advanced technology that is made available to us, and I think we can apply that indeed as proposed to the exploration in ANWR if Congress authorizes it.

[The prepared statement of Senator Murkowski follows:]

PREPARED STATEMENT OF HON. FRANK H. MURKOWSKI, A U.S. SENATOR FROM THE STATE OF ALASKA

Mr. Chairman, I commend you for scheduling these oversight hearings on oil and gas leasing on the Coastal Plain of the Arctic National Wildlife Refuge [ANWR] vital to our State. While this committee has previously debated the ANWR issue in the context of energy security, the hearings this week and next will focus exclusively on the merits of opening the Coastal Plain to oil and gas exploration.

This hearing begins what will undoubtedly prove to be a long and difficult process of reaching a resolution of the ANWR issue. During that process, this committee will make numerous decisions that will have a substantial impact on the future energy security of this Nation. It is therefore appropriate, Mr. Chairman, that the committee devote a substantial amount of time and effort to the ANWR decision.

Today's testimony is not the last we will hear on this issue. Facts and figures will be coming from all sides. I would urge my colleagues not to make up their minds prematurely. And ask them to consider our Nation's energy situation, to consider what the Interior Department has concluded about ANWR, and above all, to keep an open mind.

Determining whether and in what manner oil and gas leasing should be permitted on the Coastal Plain of ANWR is one of the paramount "energy" issues the

Senate will address this Congress. And it is an energy issue, Mr. Chairman, not an environmental issue, as some would prefer to characterize it.

Opening ANWR gives us the chance to make decisions on facts. If we don't proceed with opening, we'll remain ignorant of our national energy reserves. There should be no choice between ignorance and knowing what's there.

We now have a full twenty years of experience with oil and gas exploration, development, and production of Alaska's North Slope. During those two decades, we have learned that such activities can be carried out in a manner that does not damage the arctic environment. We have learned that oil and gas activities in the Arctic and environmental protection are not mutually exclusive—we can have both.

The oil industry's record of environmentally sound operations at Prudhoe Bay, Kuparuk, Endicott, Lisburne and the Naval Petroleum Reserve provides the proper context for examination of the ANWR Coastal Plain issue.

In the ANWR debate, it's a bogus question to ask: "Shall we sacrifice the environment of the Coastal Plain for a few months supply of crude oil?"

The relevant question should be this: "Are we willing to accept a modest and temporary modification of the Coastal Plain's wild and natural State, in exchange for the opportunity to explore and develop the oil and gas reserves that may be there?"

My answer to that question is an emphatic yes, Mr. Chairman. There are already more that 56 million acres of designated wilderness in Alaska. In ANWR itself, over 40% of the 18-million acre refuge—8 million acres—is wilderness. On the other hand, the 1.5-million acre Coastal Plain is the most promising, onshore, unexplored oil and gas prospect left in North America.

We need to examine these statistics in light of recent reports which have predicted a future energy crisis and the ever increasing tensions in the Middle East. When we do, it simply does not make sense to turn over backs on another Prudhoe Bay by adding another 1.5 million acres to Alaska's wilderness.

Without knowing what's in ANWR, our national concern with OPEC will graduate into a full-blown national paranoia.

I want to welcome Secretary Hodel and Assistant Secretary Horn. I look forward to hearing your testimony today and working with you both as the legislative process unfolds.

TRANSCRIPT OF A CONVERSATION BETWEEN DR. TOM BERGERUD OF THE UNIVERSITY OF VICTORIA, BRITISH COLUMBIA AND SENATOR FRANK H. MURKOWKI

FM: Dr. Bergerud, I understand that you have devoted a good portion of your life to research on caribou. Can you tell me a little bit about your background and the observations you've made on the caribou in various areas of the world.

TB: Well, I've been working with caribou since 1955. I was a chief biologist in Newfoundland for many years and then the director of the game department.

I worked with the Newfoundland herds, then I worked with the Labrador herds, the herds in Quebec, Ontario and lately in British Columbia and the Northwest Territory. I've had one field in Alaska.

I spent 22 years on the calving grounds when the cows were giving birth. I spent 19 years with the animals during the rut. I've devoted my whole professional life to the well being of the species.

FM: You've been quoted as calling caribou one of the world's most adaptable animals. Could you elaborate a little bit about what you mean or is that a fair statement?

TB: Well, they're not the world's most adaptable, but they're very highly adapted to the Arctic environment and they are also adaptable. They can make plastic responses, they can adapt to man establishing buildings and so forth in their area.

They can tolerate being near man. In fact, reindeer which is the same species as caribou, is one of the animals that man has been able to domesticate. So they certainly are adaptable -- they're able to take great extremes in the environment and their natural environment being so tough -- I mean that is why they have prospered because they have been able to come up with these adaptations.

FM: I'm interested in the question of activity associated with oil and gas exploration in the area of caribou habitat or in their calving ground.

What happens when there's exploration in an area where they traditionally come to calve?

TB: Well, the calving grounds of most of the big herds are on the northern edge of the annual distribution of the herds.

There is a debate about why caribou go to calving grounds and I think that is very important in trying to understand what would be the significance of the development on the calving grounds.

The paper that I've been publishing and is becoming more generally accepted is that caribou go to calving grounds as an anti-predator strategy. They go to the very northern edge of their range and this allows them to get away from wolves. Wolves usually den along tree lines, so that is the most important thing to keep in mind.

The caribou are going to calving grounds in my view to escape wolves not because there is some unique food supply or forage there. Some people would say that if we displaced caribou from an area they are going to decline. And usually this is based on a view that they think that the food resources are critical on these calving grounds and in fact I've done some studies up in Alaska on the calving grounds and can show that actually the food is quite poor. Where the bulls are, south of the calving grounds, the food is much better and if the cows were really interested in food supply they would have stayed back with the bulls. But, they've gone up to get away from the predators.

Now because they're worried about predators they are liable to disturbance -- when they see a vehicle coming down the road it represents a predator to them. They are not disturbed by the road without the vehicle. We can expect that if we have a road with traffic in a calving ground that the bulls will probably pay little attention to the road but that the cows will move back perhaps a mile from the road and then they will resume their normal activities.

In fact, we don't want the caribou to habituate to the traffic because in fact this is their natural predator response.

FM: Do I understand you to say that the mere presence of roads, drilling pads, and drill rigs will not necessarily displace the caribou? Rather, it is the activity associated with those structures -- men and vehicles working, etc. -- which may cause the caribou to move away from the area. If the men and the vehicles weren't there, the fact that there was a road or a pad wouldn't necessarily disturb the caribou?

TB: It's the disturbance that causes them to be displaced, if they are going to be displaced. It doesn't necessarily need to be traffic.

One person did a study up there on the Central Arctic Herd and he made a fence and he had burlap bags hanging on the fence. When the bags flapped in the wind, the caribou avoided this fence, in my view because it resembled a predator.

If you have things that look like predators it's the predator response on the road that makes them peel away.

Now this is mostly the cows and the calves. The bulls are not nearly as shy of predators. They actually go into the willow valleys to feed. That's what they have to do to get big and breed females. The female has to stay away from predators so her calf will live.

And even if there's a lot of traffic on the road, the displacement is only a mile on each side of the activity. So if we do want to keep all the traffic going, we will lose a strip of occupation of about two miles wide.

The big thing is that we don't have a barrier. I don't see why we should worry about this two miles on each side because the range is not limiting.

If we monitor the percent calves -- even if they are displaced -- and we are prepared to manage the predators, we can always have positive recruitment. And the herd can continue to prosper.

FM: How does noise associated with the activities of man affect the caribou?

TB: I was in the Delta Herd in Alaska. That herd is near an army base. Right at calving time the army people used to come out with their big Huey helicopters which really look sinister at very low elevations and the caribou were so habituated to this noise that they didn't even stand up.

I've also watched caribou when dynamite has gone off. If the noise doesn't have any impact on their well being, they habituate with it. If you roar up to a caribou in a ski-doo and start ~~shooting~~ at it, then the noise of a ski-doo has very dire consequences for them and they will not habituate to it.

But a noise of a feeder station or an airplane that does not result in any further consequences but the noise, they will soon habituate to it and will pay it little mind.

FM: Do you know of any areas where caribou are currently are in close contact with the activites of man?

TB: I was over in Norway once in 1979 and I watched a caribou herd right in the middle of Army maneuvers. In Norway they maneuver in the national parks in unusual situations. The caribou were paying no heed to this.

The Central Arctic herd next to the Porcupine herd of course has a tremendous amount of development -- pipes and feeder lines and so forth, and that herd has prospered; increasing from some 3,000 to 15,000 during the development. I think that's the acid case that shows that caribou can co-adapt to this.

They cannot co-adapt to being over harvested, but they can certainly take living side-by-side with an ethical man.

FM: Doctor, I want to thank you very much. You have provided an unique insight based on your 32 years of observing the caribou all over the world. We very much appreciate your thoughtfulness in giving your views and actual experience in observing this tremendous resource of all of North America and Europe. Undoubtedly we will have a chance to call on you again. Thank you.

Senator MURKOWSKI. I have just a couple of questions, and I am going to be a bit broad as well, since this is an oversight. And I would like to hear your explanation very briefly, as former Secretary of Energy, of what your views are of the current situation in the Persian Gulf.

Secretary HODEL. I think the situation in the Persian Gulf simply manifests what we have been saying to each other, but maybe we have not fully accepted or realized what it meant when we said that it is a volatile area, an insecure source of supply.

When you realize the enormous importance it has to the world oil supply, you have to be concerned over any actions that we take which increase our dependence on imports. I have previously made the point here, Senator—I do not want to bear down on it too hard—but our production is falling, our consumption is rising, our imports are rising, and we are moving toward a 50 percent import level.

We have talked about 50 percent dependence, by the way, as if it were some magic number. I do not think 50 percent has any particular significance in and of itself. It is simply a relative measure. But I do think it will have psychological significance.

Senator MURKOWSKI. Well, let me move it a little closer. We talk about the Persian Gulf. We get, I am told, six percent of the oil from the Persian Gulf. Western Europe gets 35 percent, and the rest goes to Japan.

Japan in my observation is doing very little to protect the continued flow of that oil. We are doing a great deal. Now, what is your assessment of that kind of a ratio?

Secretary HODEL. First of all, it is a world oil market.

Senator MURKOWSKI. I understand.

Secretary HODEL. So that if we took no oil from the Persian Gulf and all of it went to Western Europe and Japan, split evenly or split in some fashion, interruption of supply from the Persian Gulf would affect us as directly and as significantly as if we were receiving a significant supply from the Middle East.

It is because oil is fungible and it will move. In a buyer's market, oil moves from the closer source, generally, to the user. In a seller's market, it will go wherever people are willing to pay the highest price.

But we cannot, nor can our allies, look at the Persian Gulf and say their share is not great enough to cause them to be concerned about what is happening there. If the Gulf were cut off as a source of supply, it would have a very substantial effect on the availability of oil in the world and that would include the United States.

Senator MURKOWSKI. Could you direct a little more your opinion of how we share that burden with the rest of our allies?

Senator FORD. You have the International Energy Agency, the IEAE.

Senator MURKOWSKI. Well, I think there is a lot of room for sharing. But as long as we are doing it, why should anybody stand up and say, hey, we will volunteer to pick up a portion of it or we will take some ships on lend-lease?

Secretary HODEL. Senator, you can ask a lot more questions about the geopolitical justification for our activities there than I can possibly hope to answer as Secretary of the Interior.

Senator MURKOWSKI. Tell me, Mr. Secretary, there have been charges made from time to time by various groups of an alarming rate of pollution associated with the activity at Prudhoe Bay, and I am wondering if you or your Assistant Secretary could comment on your opinion of the accuracy of that?

Secretary HODEL. Let me start and I think Assistant Secretary Horn may have further comments.

I was in Alaska last summer just before Labor Day when a group of the leaders of the environmental organizations visited Alaska. Prior to that visit, we had all, I think, thought of Prudhoe Bay as a prime example of how you can successfully develop something with sensitivity to the wildlife and the environment.

Having been to Prudhoe Bay on several occasions, I was surprised, therefore, to read comments after that which appeared to attack the air quality and the handling of drilling muds in open pits at Prudhoe Bay. I think that was news to a lot of people.

My understanding is that Prudhoe Bay is complying with the environmental requirements, and we have not seen adverse effects from the activities going on there.

Let me make one other observation. The attack upon going forward in ANWR has generally been focused on the potential effect on wildlife. The attack on Prudhoe Bay as a model for us to look at has been aimed at air quality issues or environmental quality issues not affecting wildlife. There is a disconnect between those two arguments, and I just need to make that point—that the concerns that have been raised at Prudhoe Bay, which I think we can answer satisfactorily, are not related to the concerns about wildlife damages that could occur in the Arctic National Wildlife Refuge.

Mr. HORN. Let me just add that, based on our review, we are unaware, in consultation with the EPA and the State DEC, of what I would call any significant air and water quality problems.

As a matter of fact, I think the only violations we are cognizant of are some short-term particulate violations, basically dust coming off the gravel roads incident to traffic in the Prudhoe Bay complex.

Our report would point out that, obviously, any orderly, sensitive leasing and development program would be subject to the comprehensive statutory and regulatory air and water quality programs administered by EPA and State DEC. And based on the track record at Prudhoe, we think that would permit lessees to undertake and discharge their responsibilities in such a fashion that air and water quality problems would be avoided in the 1002 area just like they have been essentially avoided in Prudhoe Bay.

Senator MURKOWSKI. It is my understanding that the well that was drilled near Kaktovik by Chevron in conjunction with the Arctic Slope Regional Corporation covered a pad not much bigger than twice the size of this room.

Secretary HODEL. Assistant Secretary Horn says it was a couple of acres. That is as I recall it, also.

Senator MURKOWSKI. Well, I am glad this room is not a couple of acres.

And it had a wooden pad there at one time.

Secretary HODEL. With styrofoam underneath.

Senator MURKOWSKI. With styrofoam underneath.

Secretary HODEL. For insulation.

Senator MURKOWSKI. And then they had an ice road up to it and they utilized the ice road. And what happens when the ice melts? What happens to the road?

Secretary HODEL. It disappears.

Senator MURKOWSKI. So there is today no evidence of a road, and the only evidence is that there is a gravel pad on some area?

Mr. HORN. I think all that is left——

Senator MURKOWSKI. I would like for the record to show from your testimony, what is left of this? I know; I have been there.

Mr. HORN. I think if you go there, not knowing exactly what to look for and exactly where to look and you are flying over that expansive area, you will be very, very hard-pressed to find it. I think all that remains might be some vestiges of the reserve pit that they had to keep on hand for drilling safety purposes and fluid handling.

But the pad itself was picked up. The railroad ties are gone, the styrofoam is gone. The ice airstrip melted, the ice road melted. I think you just have a little bit of grey gravel sitting out there amidst the grey tundra.

Senator MURKOWSKI. And that apparently has no effect on the caribou?

Mr. HORN. No. I mean, you are talking about such de minimis acreage that it will not have any measured effect on anything.

Senator MURKOWSKI. I am wondering, with respect to the activity in Canada that has been mentioned, it is my understanding that the field that you are referring to the east of the MacKenzie Delta is the Emoligak. And it is an offshore area that the Canadian Government invested a good deal of money in association with Dome Petroleum. They have some 800 million barrels offshore of available oil, but they have no way to get it out, other than perhaps bring a tanker or perhaps an icebreaking barge or both in there, which we have not contemplated as far as moving any of the Prudhoe Bay, ANWR oil, simply because of the economics and the environmental risks associated with moving oil by tanker through the ice.

I am wondering, without getting in hot water with our neighbors from Canada, if you could assess their plan to bring some of this oil out from an environmental point of view as compared with the merits of a pipeline, which we already have.

And I gather that if there was oil found in ANWR that it might be feasible for the field on the Emoligak to come into a feeder pipeline and eliminate the exposure associated with moving the oil by tanker.

Secretary HODEL. First, let me say that we are in consultation now with Canada regarding their plans for transporting oil by tanker through the Beaufort Sea. In our view, this is a significantly more hazardous means of transporting oil than by pipeline.

I do not know what the outcome of that discussion will be. But the Canadian decision to do that was initially undertaken without consultation with us. At the time they raised considerable flap about whether we had adequately consulted with them concerning ANWR, this transportation matter came to light, and we have been engaged in discussions with them since.

The difficulty for the Canadians in coming across the border and connecting with the pipeline would be, as I understand it, that the U.S. wilderness area runs along the Canadian border all the way to the sea and, on the other side of the border, their national park runs all the way to the sea.

So if they are not to build a pipeline right through their own national park and through our wilderness area, they presumably would have to go out into the Arctic Ocean and somehow build a connecting pipeline there.

I do not know what the engineering feasibilities are, but I think we would want to be extremely sensitive to that, because we have concerns about and responsibility for the bowhead whale. We require that drilling activities in the Beaufort Sea be severely restricted when there are whales in the vicinity.

We have not studied the effects of tanker traffic on those whales, so far as I know, in the area that they are talking about.

So we have some very serious concerns about that.

Senator MURKOWSKI. You do not know what restrictions the Canadians have initiated as a consequence of the migratory movement of the bowhead whale?

Secretary HODEL. I do not know, but it is my impression that they are not as restrictive as we have been.

Senator MURKOWSKI. I think it is important to view the question of the movement of this Canadian oil, because I think it is a concern to this Committee, as well as our State.

It is my understanding that the Emoligak field is approximately 1,400 miles from the nearest Canadian pipeline. The economics of that dictate that, if they are going to take the oil out, they are either going to do it by tanker or they are going to attempt to hook up with the Prudhoe Bay pipeline, if indeed ANWR goes ahead.

But it is my understanding—and you have already touched on it in your testimony—that in the pattern migration of the Porcupine herd that goes through what is now their national park, that they did do extensive drilling prior to making it a national park and evidently were satisfied that it did not contain sufficient reserves of hydrocarbon, and as a consequence they so designated it for a national park.

Secretary HODEL. I am not sure how extensive the drilling was, but to my understanding it was sufficient to persuade someone that there was not a significant oil potential in that area.

Senator MURKOWSKI. Mr. Chairman, I have other questions, but I want to give an opportunity to the rest of my colleagues, and then I would like to have a second round if you are going to continue that.

The CHAIRMAN. Senator Bumpers.

Senator BUMPERS. Mr. Secretary, let me get into a couple of areas I do not think have been covered this morning. The first, in looking at the wildlife refuge, there is an area out there called Kaktovik. That is also an Alaskan Native claims area called the Arctic Slope Native Corporation, is that correct?

Secretary HODEL. I think it is Kaktovik. Perhaps I should ask Assistant Secretary Horn to sort it out.

Mr. HORN. The surface estate is owned by the village corporation, which is the Kaktovik-Inupiat Corporation, pursuant to the terms of the 1971 Alaska Native Claims Settlement Act. The subsurface under the village lands is now owned by the Arctic Slope Regional Corporation, also established by the same 1971 Act of Congress.

Senator BUMPERS. Now, the reason they own the subsurface of that area there is because of an exchange that we entered into with them, under which we got some inholdings in other areas in exchange for giving them the mineral rights under this land, is that not correct?

Mr. HORN. It is a little more complicated than that. The precursor to the 1983 land exchange executed between the Department and Arctic Slope was based on the section 1431, in title 14 of the Alaska National Interest Lands Conservation Act passed by Congress in 1980.

Section 1431 provided a future contingent interest in the subsurface to Arctic Slope. It provided that if the Congress were ever to open the 1002 area anywhere near Kaktovik, Arctic Slope would automatically acquire the right to take the subsurface.

In return for acquiring that mineral estate, all they would have to do would be to relinquish to us other subsurface holdings they had anywhere else on the North Slope, at their discretion.

Our estimate was that they would probably have to give us about $12,000 worth of probably worthless subsurface someplace else. So that Congress——

Senator BUMPERS. $12,000?

Mr. HORN. $12,000 worth of value is what we had estimated. They would obviously give us the worst, while picking some of the best.

Senator BUMPERS. Incidentally, let me interrupt you for just a moment. Do not lose your train of thought. How many acres are in that area?

Mr. HORN. The whole entire Alaskan North Slope?

Senator BUMPERS. No, no, no. Just the Kaktovik.

Mr. HORN. 92,000 acres.

Senator BUMPERS. 92,000 acres?

Mr. HORN. Yes, sir. Now, the——

Senator BUMPERS. Now, that is 92,000 mineral acres that the United States Government no longer owns, is that correct?

Mr. HORN. That is correct. Congress provided that the United States could never be the beneficiary of that subsurface estate. Congress provided in section 1431 that, if this area were to be developed, the natives would have an immediate vested interest in taking this land, so they would be the ones to acquire the interest.

We decided that, since if it were to be opened under those circumstances and all we would get out of it would be a bunch of worthless subsurface someplace else in the North Slope, when they came to us with this land exchange proposal it provided us an opportunity to pick up over 100,000 acres of wilderness inholdings in the Gates of the Arctic National Park in the vicinity of Chandler Lake.

So we concluded that we had a choice. We could-either not do anything along the lines of a land exchange, at which point if this area were opened the natives would get it and give us the worthless subsurface, or we could accelerate their future interest and essentially pick up these important park inholdings so we could derive some public values.

That exchange was then executed in August 1983, and——

Senator BUMPERS. That was done administratively and Congress was not required to approve that exchange?

Mr. HORN. That is correct. We had administrative authority. Congress was duly notified, and we signed the exchange in early August 1983. There were a number of challenges.

Senator BUMPERS. Are you telling us you did not have any choice about this, because under the Alaskan Lands Act they were going to get this subsurface anyway?

Mr. HORN. The options would have been that, if Congress opened the 1002 area, the Arctic Slope Regional Corporation had a vested right per Congress to the mineral estate in this area.

Senator BUMPERS. All right. Now, and pursuant to that there was also an agreement that, if any drilling took place there, that there would be no production until Congress opened the 1002 areas for development and production, is that correct?

Mr. HORN. That is correct. That is per statute.

Senator BUMPERS. And pursuant to that, Chevron has drilled a well there, have they not?

Mr. HORN. That is correct.

Senator BUMPERS. And you do not know what that well has in it, do you?

Mr. HORN. That is correct, sir.

Senator BUMPERS. Is there any way you can get that information?

Mr. HORN. No. We asked for it, but let me explain the situation. These of course are now privately held fee lands and, given the nature of the statutory arrangement in title 10, we could not provide the native corporation any assurance that we could hold that information in a confidential fashion.

The data that we acquire in this broader 1002 area is not subject to the same type of informational protections that we have, for example, under the OCS Lands Act. If we had acquired that information, it could have been subpoenaed from us and, the Freedom of Information Act would have applied to it. Because we could not assure them that we could hold it confidential, we did not ask for it.

Senator BUMPERS. Well, does the Arctic Slope Native Corporation know whether that well is a producer or not?

Mr. HORN. They know, obviously, because they leased the land in turn to the private oil company.

Senator BUMPERS. So what you are telling us this morning is that there is already a well there that has been shut in because of a legal obligation not to develop and not to produce until the rest of the Arctic National Wildlife Refuge is open.

And yet, there is information there that is proprietary information from Chevron and the Arctic Slope Corporation. Both of those people know what is in that well, and the rest of us do not, and we are being asked now to open the wildlife refuge without ever getting that information; is that correct?

Mr. HORN. That is basically what the statutory scheme that emanated from section 1431 and title 10 provides.

Senator **Bumpers**. Now, if we were to agree to open that North Slope land, the wildlife refuge there, for drilling, would Chevron have a competitive advantage on how much to bid?

Mr. **Horn**. I think—who knows?

Senator **Bumpers**. Oh, you know the answer to that question.

Mr. **Horn**. Sure, they have——

Senator **Bumpers**. The answer is in the question.

Mr. **Horn**. They have a little more information. There are 26 structures and an unknown number of prospective stratographic traps. They have some measure of down-hole information on one of those 26 structures.

So, yes, in terms of leasing in that one area, they probably have a little bit of an informational leg up on somebody else.

Senator **Bumpers**. Do you have any whispers or rumors or gossip as to what that well has in it?

Secretary **Hodel**. Senator, I have asked about this well in the past. The advice I got was the thought that the well was largely in the nature of what in the OCS we call a cost well—an off-structure test well to determine something about the geology.

Now, I do not know if that is true, but that is the impression I was given. The only thing I can say beyond that is that the parties who apparently have knowledge about what is in there, Chevron—and I think they had another partner——

Mr. **Horn**. Standard.

Secretary **Hodel**. Standard of Ohio, Sohio.

Senator **Murkowski**. I might add that BP is buying Standard of Ohio, which is now Standard of Alaska.

Secretary **Hodel**. The partners have not shown any diminution of interest in that area. I think everybody takes that as some indication that they think it was——

Senator **Bumpers**. Maybe we ought to open that refuge conditioned upon them giving us that information. Just reverse it. If they are sitting on a well there that is worth anything and they cannot produce it until we open it, we might turn around and say, we will not open it until you tell us what you have got there.

Mr. **Horn**. My recommendation is that you take it up with the native corporation, since it is their land pursuant to the Alaska Native Claims Settlement Act of 1971, and deal with it in that fashion.

Senator **Bumpers**. Well, they are going to testify this week, so we will present this question to them.

Secretary **Hodel**. They should have more direct and immediate information.

May I comment also, if we had the information and if it told us that there was nothing there, it would contribute almost nothing to the consideration. In phase one, if there is no recoverable petroleum suggested by that well in that spot, if you look at the drill cores that have been made west of this area, you find very distinct shifts in the geology.

Drilling a hole in one spot and finding nothing, no production area, does not necessarily mean that moving over a half a mile would not change that.

Senator **Bumpers**. Well, I understand all that, Mr. Secretary. But it certainly would be interesting, would it not, for this Committee to at least know, I mean, if they are sitting there on a 10,000 barrel a day producer?

I understood you to say at one time, maybe in my office, that the potential for finding oil there was at 20 percent. Is that correct?

Secretary HODEL. With respect to recoverable oil, the potential is approximately 20 percent.

Senator BUMPERS. So you know, I would not bet on a horse on those odds unless if he had been given Lasix or something that I thought might spur him up a little I might. [Laughter.]

But in this case, you know, my attitude would change dramatically, probably, if I knew that was a big producing well there. Then we would know we have got a reservoir——

Secretary HODEL. Senator——

Senator BUMPERS [continuing]. Even though we know the geology up and down the coast there is quite different.

Secretary HODEL. I think I understand your concern. Let me suggest that we are as confident as I think is humanly possible that exploration will not jeopardize any of the wildlife values, and in fact once terminated it will not jeopardize the wilderness values of this area.

The only risk to those values is in the event something is found. Obviously, if something commercial is found there would be enormous pressure for us to go forward and develop it.

Therefore, there is almost a zero cost to approving a leasing program in the event nothing is there. If the 80 percent chance prevails, there will be nothing further happening.

If, on the other hand, exploration does find something, the significance to this country in terms of the potential is very, very large—dwarfing the potential information that might come from knowledge of a single well. We know for example, that eight or nine wells were drilled at Prudhoe before anything was found.

If we had decided not to open Prudhoe Bay because the first, second, third, fourth, and so on wells were dry, we would have passed up the largest single field in the history of North America.

Senator BUMPERS. I understand that, Mr. Secretary. I am just saying that this ought to be a consideration. It is not a definitive consideration, but it ought to be one.

Secretary HODEL. I will read the record of the questions you ask the native corporation with great interest.

Senator BUMPERS. Let me change gears just a little bit and ask you, number one, the law now specifically prohibits the exportation of North Slope oil, does it not?

Secretary HODEL. That is my understanding.

Senator BUMPERS. Would that same law prohibit the exportation of oil from this area?

Secretary HODEL. If it goes through the Trans-Alaska Pipeline, I am told the answer is yes.

Senator BUMPERS. Well, would this oil, if we discovered oil in the refuge there, would it not be piped over to the Alaskan Pipeline?

Secretary HODEL. All of our assumptions have been that it would be.

Senator BUMPERS. So your answer to the question is yes, exporting of oil from the slope, from the refuge, would be prohibited?

Secretary HODEL. That is correct.

Senator BUMPERS. Now, if that is true of oil, why is that not also true of natural gas?

Secretary HODEL. It's my understanding that the current law does not provide that.

Perhaps I should ask Secretary Horn to respond.

Mr. HORN. My understanding is that, obviously, the oil pipeline is in place pursuant to a 1973 specific Act of Congress that authorized the granting of the right of way and established special terms and conditions.

Any natural gas pipeline that may be constructed in the future would be constructed subject to the second statute, the ANGST, the Alaska Natural Gas System Transportation Act, passed in 1978 if my history is correct.

I think that Act set out different terms and conditions regarding the prospective export question. Unfortunately, I am not in a position to give you many more answers about the provisions of the ANGST, but I do know that it is different than the provisions of the 1973 TAPS Act.

Senator BUMPERS. Well now, just yesterday the White House endorsed a feasibility study on the exportation of natural gas to such unspecified areas as Taiwan and Korea and Japan. And there is a group headed up by Wally Hickel known as the Trans-Alaskan Gas System, who want to get involved in the exportation of this natural gas.

And yet, we also have still at least a lingering interest in building a gas pipeline in consultation at least or maybe in partnership with the Canadians. And now the President, or at least the White House, yesterday virtually endorsed the exportation of this natural gas.

Now, my question is, if we are talking about national security as a justification for opening this refuge, why is natural gas not just as important to our future as oil is?

Secretary HODEL. Natural gas has not been usable off the North Slope at the present time, because a transportation system is lacking. The analyses that were done for transporting natural gas to the lower 48 states independently or in conjunction with Canada indicate an enormous price tag, which appeared to render it uneconomic.

In addition, there was enormous environmental objection to building another pipeline not parallel to this one. In fact, part of the Hickel group proposal is to parallel the existing pipeline in order to minimize those kinds of problems. It also contemplates a potential branch off of the pipeline that would connect somewhere for export purposes, if that could be accomplished environmentally and economically. It is not at the present time clear that it could be.

So the thrust of the proposal is that a large volume of natural gas is there which is not reachable at anything approaching economic levels. We had estimates when I was Secretary of Energy. With those cost estimates, we were looking at natural gas ranging in price between $7.50 and $15 per thousand cubic feet, placing it enormously above anything currently anticipated.

Senator BUMPERS. What has happened to the 1977 agreement that we entered into with Canada on the—called the Agreement on

Principles, relating to the construction of the Alaskan Natural Gas Transportation System? Where do we stand with the Canadians on that now?

Secretary **Hodel**. I believe that is an authorized project. The Canadians have built a significant portion of what they call, I think, the prebuild portion of that pipeline. They have been considerably disturbed by the fact that we did not connect with it, because they have had a pipeline which is built, which is taking gas from their gas fields, but which is not sufficiently loaded to make it economical.

Senator **Bumpers**. Have you stayed on top of the economics of natural gas and the feasibility of building that pipeline, and if so what price would gas have to bring before it could become feasible? Could you tell us about that?

Secretary **Hodel**. I have not.

Senator **Bumpers**. Do you have any way of getting that information for us?

Maybe we ought to bring some of these industrial tycoons in here who are involved in this and let them tell us.

Secretary **Hodel**. My reaction is this. First of all, my understanding is the President has authorized the study that you have indicated. He must make a couple of findings, and I do not remember precisely what those are, with regard to no adverse effect on national security and effect on raising the price of gas if this were to be undertaken, before he could approve an export license.

I think that is almost a self-limiting kind of situation, because if the economics are such as was the case in the past you will not be able to finance and build the pipeline. You may have the export license, but you must then find somebody willing to pay you to build the pipeline system and the facilities for liquefying it and then transporting it to these potential sources of use—that is a very high cost operation.

At the moment, it looks to me like it would be very economically difficult to do. On the other hand, if it is economic it appears that it would precede by a long time the economic transportation of that natural gas to the United States.

Senator **Bumpers**. I am one who has been concerned about the building of this pipeline and about the loss of the gas on the North Slope by not building it. And what happens—what is going to happen to the natural gas in Prudhoe Bay?

Secretary **Hodel**. It is being reinjected.

Senator **Bumpers**. I know it is now, but that is in anticipation of ultimately building the pipeline, is it not?

Secretary **Hodel**. And I think it is because of restrictions on the allowable discharge into the atmosphere.

Senator **Bumpers**. Well, I am disturbed to some extent, not only over this well and the claims up there, but I am also disturbed about the argument that we have to do this for national security purposes and then turn around and export.

What would be the equivalent barrels of oil we would be exporting if we exported the natural gas in this field, under your best case scenario?

Secretary **Hodel**. I do not know, but that presumably would be the——

Senator **Bumpers**. Well, what is the highest estimate of the reservoir in the area?

Senator **Murkowski**. 26 trillion cubic feet of gas in the Prudhoe Bay reserve, proven reserves. The estimated cost of bringing that gas out——

Senator **Bumpers**. That is one-fourth, Senator, of the total gas reserves of this country, 26 trillion cubic feet, if that is in fact the estimate.

Now, the idea of exporting that is really anathema to me. That is a lot of gas.

Senator **Domenici**. How much would it cost to build the pipeline?

Senator **Murkowski**. $30 to $40 billion.

The Canadians have been supplying the gas that the Alaska gas was supposed to supply, and the Canadian gas is cheaper and the Canadians will continue to supply that gas until their price goes up.

Senator **Bumpers**. 26 trillion cubic feet of gas, that is 26 billion mcf's. And at two dollars an mcf, that is $52 billion, and that does not count the gas on the North Slope.

So that it may be that if you find oil, this oil and gas up there that you are talking about, this pipeline would immediately become—incidentally, I cannot believe those figures. I would like to look into that. $30 to $40 billion to build a pipeline?

Secretary **Hodel**. That is what they were estimating when I was Secretary of Energy, and this issue was rather hotly discussed with some of the Canadian interests.

Senator **Bumpers**. Well, in my opinion you will have a natural gas shortage either in existence or developing in this country by the time you could develop that field.

Secretary **Hodel**. It may be that the developers anticipate that and would recognize that an option, which you could not execute today, would be to push additional gas through the pipeline, convert it to liquefied natural gas, and then move it to the lower 48 for transport in the existing pipeline system.

As far as I know, nobody has suggested that, but they very well may have that as a backup thought because you may be right on target about the supply.

Senator **Bumpers**. Mr. Secretary, one last observation. That is, are you obligated, legally obligated, and if you are not will you assure this Committee that you will not enter into any of these exchanges of minerals for surface or vice versa without Congressional approval?

Secretary **Hodel**. Absolutely, Senator. I promise the Committee and the Congress that we will not enter into exchanges in this area without submitting the proposal for approval by the Congress.

I think that is an essential ingredient, because it seems to me there is an issue here that needs to be resolved by the Congress. That is, whether or not there can be any exploration and development in this area. I hope it will permit that.

If it does permit that, I would hope that, in addition to leasing, we will be able to present to the Congress a potentially unique opportunity to acquire in excess of a million acres of some of the choicest wildlife areas now owned and operated by the native corporations.

Senator Bumpers. Those are going to be expensive ducks if you make any more exchanges like this.

Senator Murkowski. We will be embarrassed.

Senator Bumpers. You are talking to a consumate environmentalist and conservationist, incidentally, what kind of assumptions did you use on the value of those mineral rights up there?

Mr. Horn. When the exchanges were made on the Kaktovik lands, we had to employ the statutory valuation system that came out of section 1431(o), which in essence said that the Government could never derive the full value of the mineral estate because of the statutory regime.

We estimated that the statutorily imposed value that would come to the United States Government from the exercise of section 1431 would be around $12,000 to $15,000. Then of course, at that point we went ahead and picked up this 100,000 acres of park inholding, which we estimated in the millions-of-dollars range.

Senator Bumpers. I have some beautiful pasture land in my state I would like to trade you fellows.

Mr. Horn. If you have a section 1431 governing the value of your farm, we will be obligated or willing to deal.

Secretary Hodel. Senator, land acquisition has proven to be a very expensive undertaking. And two years ago, we were under enormous pressure to acquire a range in southern California for the potential reintroduction of the California condor called the Hudson Ranch, and we were under pressure to spend $9 million plus to do that.

We resisted and took an enormous amount of criticism for not spending that money. Assistant Secretary Horn was determined to acquire the land, but he felt that the price had been inflated out of all sight.

By our willingness to take criticism for not acquiring the land at $9 million, we subsequently acquired it for about $4 million. Interestingly, as far as I can tell not one of the people who was critical because we would not acquire it at $9 million has ever commented favorably on our having acquired it at all or for less.

The Chairman. I am just glad this Committee did not have anything to do with that legislation.

Senator Bumpers. I have been remiss. I compliment you on that, Mr. Secretary.

The Chairman. Let us try to have one more round between now and 12:30, and I ask all Senators to hold themselves to about five minutes.

Mr. Secretary, under the law under which we would presumably develop this land if it were developed, the Federal Government would get ten percent and the State of Alaska would get 90 percent. I assume that that is too small a proportion for the Federal Government to suit you?

Secretary Hodel. Senator, we have a different ratio on all other lands than under the Mineral Leasing Act as it applies to Alaska, which would seem to me to be more equitable. But we have not addressed that particular issue, feeling that that falls far more within the kind of considerations that Congress will have to review.

The Chairman. Mr. Secretary, I put in legislation earlier, which I may or may not pursue, which would provide for 50 percent for the State of Alaska, 25 percent for the Federal Government, and another 25 percent divided between the National Park Service, the Fish and Wildlife Service, BLM, and the Forestry Service for acquisition of land.

And as I say, I may or may not pursue that. One reason I may not pursue it, even though I think it is an excellent idea, because if we do, if the Congress does, perhaps even over the protests of this Committee, authorize development there and if there are billions upon billions of dollars of oil there, it seems to me that a very good use for a portion of that would be for acquisition of wildlife habitat and parks.

Nevertheless, the environmental groups I think are, I guess the word is, opposed to that at the present time, because they might see their endorsement of that legislation as being construed by some, not by me certainly, as being an endorsement of drilling in the 1002 area.

I do not think it is that way at all. But assuming that we should move forward with that bill, would you also consider that to be in the area of what this Committee ought to decide?

Secretary HODEL. Senator, I have not had a chance within the Administration to discuss the various alternatives in your bill, and it would be very premature for me to try to anticipate what the Administration might do.

But if I may comment on it from my personal standpoint, it seems to me that certainly—I have to say this in such a way that I am not bound and beholden to support your legislation event that it proves not to be the Administration's view—but it seems to me that it is certainly in the ballpark of the kinds of things to consider.

I have been terribly troubled by the fact that it is very easy for Congress to identify an area that now is a national park or wildlife refuge or wilderness, but in fact then, because of budgetary constraints I do not ask for the money and Congress cannot put all the money into the budget necessary to acquire those lands.

We do a substantial injustice to some of the inholders who would like to sell but cannot, who would like to restore their buildings and cannot. It is not appropriate. So I would like the idea of some kind of earmarked activity, provided we can live with that kind of effect on the budget overall.

The CHAIRMAN. Well, it is money we do not have now, and I think we have got a chance to get it now. Just because you buy a life insurance policy on somebody does not mean you want him to die. And just because we would pass this kind of legislation in advance of consideration, totally in advance of consideration of the markup of this bill, does not mean that that would make us any more likely to move toward development in whole or in part.

And I just think it would be shameful, absolutely shameful, to miss that opportunity, because if anybody thinks that after this legislation is passed, if it is passed—and I am certainly not prejudging that issue—and oil is found, and then you come in and say, well, let us get our part for the parks, forget it.

OMB will be in there to say, no, we cannot do that, the deficit is too large. But I think we could do it at this time. So I just think we should not miss the possibility of buying this insurance policy on that issue.

Secretary **Hodel**. If I could comment on that, Senator, I think you are exactly right, that if this is to be done at all it ought to, if it is not done in conjunction with the decision on leasing, to precede it—removed from the unnecessary static which may relate to the overall question of whether you go forward at all.

The **Chairman**. Well, if we do bring that up I will say that you endorsed the legislation. [Laughter.]

Now, Mr. Secretary, in the draft report issued last November you indicated that the full leasing program in the Coastal Plain "could result in a major population decline and change in distribution of 20 to 40 percent of the Porcupine caribou herd."

Question number one. Did you mean a population decline of 20 to 40 percent or some population decline and a change in distribution?

Secretary **Hodel**. I meant the latter, Mr. Chairman, and if I may, perhaps Assistant Secretary Horn could explain that draft and the subsequent language that appears.

The **Chairman**. Yes, explain that language and why you deleted that language from the final report.

Mr. **Horn**. The first problem with the draft language is that, editorially, something as simple as a comma fell out. That created this misconception, at least in some of the readers' minds, about the effect of displacement predicted to occur if some of these caribou calving areas that are used part of the time are occupied by a production facility.

We know there is going to be a one to three kilometer displacement that the Secretary earlier referenced, and we thought that, depending on how large the fields are, it might be possible that you could end up with a displacement factor of 20 to 40 percent and that it in turn could cause some possible attendant mortality consequences.

Because the comma fell out, people thought that the displacement was going to result in 20 to 40 percent mortality. We wanted to correct that. When we first went through the draft report after it was out, in our consultations with Canada we made it very clear that that was an editorial mistake and we did not want to tie the 20-to-40 percent to mortality.

When we went back through after the public comment period to try to tighten up the report and basically make it the best factual presentation that we could, we asked the biologists: Now, let us see—how comfortable are we with all of this, after we reviewed all the information?

And the conclusion was that the 20-to-40 percent displacement number was just very, very conjectural. The list of if's that preceded the development of that number was so long that the conclusion was that it was in the realm of speculation.

Hence the final language says: If you have oil production facilities in one of these concentrated calving areas, yes, that will cause some displacement; that displacement is unlikely to have attendant mortality consequences, but there is a risk that it could. And that is where we came down.

The CHAIRMAN. Is there a great risk or any risk, and if so what, to other wildlife or to fish?

Mr. HORN. As indicated, the report says that, even if we get to the full production phase, we are looking at moderate to negligible effects on all wildlife and fish values in the 1002 area, except for the Porcupine Caribou herd and the muskox. I have just described what we say is the major effect on the Porcupine Caribou Herd—this risk of displacement.

The major effect predicted for the muskoxen herd is displacement to some degree from presently used habitats and some slowdown in herd expansion. But we do not anticipate any reduction in herd size.

The CHAIRMAN. What is the effect on the fish?

Mr. HORN. The problem in the fishery area is that there are only a limited number of streams and areas on the Coastal Plain that have sufficient depth that they do not freeze solid from top to bottom. Hence these fishery overwintering areas are very important.

One of the mitigating provisions that we have recommended be adopted as part of any program would be arrangements to make sure that there be no water extraction and no development or crossings basically near these overwintering holes, because they are so limited in size.

If we stay away from the overwintering areas, we basically anticipate no adverse effects on fishery resources.

The CHAIRMAN. What is the recreational use and recreation potential in the Coastal Plain?

Mr. HORN. I think right now we are estimating that there are approximately 100 people a year who may recreate in this area. Most of those folks happen to be dropped off in the mountains, and they float down a river, and of course to float to the coast they have to go across the Coastal Plain.

There is virtually no hiking, no recreational facilities out there. If you are not there during that six-to-eight week period when the caribou are around, as many of the members know, there is not an awful lot to see.

The real recreational potential in this area is just immediately to the south, up in the Peter and Shrader Lake area, where you have some really spectacular river and lake scenery in the mountains. There you have some activity, hiking and floating, and some limited sport hunting for Dall sheep in the fall.

So most of the recreation takes place in the wilderness portion of the Arctic Refuge.

The CHAIRMAN. Up in the mountains, the water is not frozen, in the south?

Mr. HORN. An example is the big lake system there that is immediately south of the 1002 area. The lakes are sufficiently deep that they do not freeze top to bottom and so the fish can overwinter.

But most of the streams on the plain are so shallow that they are solid ice in the wintertime, and except for a few deep holes they do not hold fish.

The CHAIRMAN. One final question. The pipeline tariff on the Alaskan pipeline exceeds six dollars now, does it not?

Secretary HODEL. I am sorry?

The **Chairman**. I think it does. I think it started off over seven dollars. It comes down over time. It is something over six now.

Do you know what a projected tariff would be, if you found another Prudhoe Bay in this area? Would it not be substantially less? So would not the profit to Alaska, to the Federal Government, to the pipeline, to all of these, would not that profit potential be substantially more, and how much more?

Secretary **Hodel**. This I do not know, Senator. But I could try to get something for the record. Let me just say, as a general matter, it has appeared to me that the major expense was the building of the Trans-Alaska Pipeline. If with a 100-mile-long or 70-to-120-mile-long connector, the equivalent of another Prudhoe Bay could be made available to the pipeline, the initial investment in the pipeline would be amortized over a much larger volume of oil and it ought to bring whatever cost calculations have been made previously down.

The **Chairman**. I know it must be substantially less, and one of the issues we would need to deal with if we were to authorize drilling would be what the fair allocation of this is to the State of Alaska and elsewhere. And I would think that the profit potential would be substantially more.

Senator Wirth.

Senator **Wirth**. Thank you very much, Mr. Chairman. And let me again say publicly what I have said to you privately in commending you for the very prudent approach that you have taken toward this very difficult issue.

I for one appreciate it, and also appreciate your thoughts, that if we decide to go ahead and approve the request of the Administration—and that is I think a very big "if"—if we decide to do so, the idea that you have floated about using some of the revenues for the acquisition of land is one that I think we ought to consider very, very carefully.

That is a very creative approach, and again I appreciate that.

If I might, Mr. Secretary, come back to very quickly just finish off on the analysis of the energy program, to try to put into context the urgency that you are suggesting exists.

Let me just complete part of that record by suggesting that, in the area of solar energy, where we had a commitment in 1981 in 1981 dollars of some $250 million a year focused on solar energy, that has now dropped to a little less than a quarter of that in 1988 dollars. So we have dropped very dramatically in any commitment to solar energy.

In the area of costs of oil and trying to hold up that cost, the question asked by Senator Bingaman earlier, the Administration has, as you know, consistently refused to move into that marketplace and to support an import fee.

In the area of appliance standards, I think that the President vetoed the appliance legislation and the Congress had to take the issue up again this year. I think the vote in the Senate was about 95 to 4 or something in that neighborhood.

I just wonder what the pattern is of a commitment to an energy program that meets the goals that you suggested to us earlier, "to provide an adequate supply at a reasonable cost".

I am not saying—I realize that you are only one Department in many, but we have to try to look at the overall picture. And I do find it extremely difficult to believe that we ought to go charging ahead with a sense of urgency here when almost nothing has been done in every other area.

Secretary HODEL. I can respond to your question as it relates to the Department of Energy through the time that I was Secretary. During that period of time, you would have found a very substantial reduction in the dollars attributed to each of these categories and alternatives and conservation, largely because of the reduction in the number of dollars we were spending on pilot projects, which absorb large sums of money.

There is an argument that can be made on behalf of the Government doing pilot projects, but we felt that it was overridden by the urgency of proceeding with research.

Let me then just make one other observation, if I may. Even if we were doing all that you might want to be done in that area, I think the conclusion would still be that in the year 2000—even if we were optimistic about some kinds of breakthroughs and substantially more conservation than we now think possible by the year 2000—we would still see this Nation heading toward a very heavy oil dependency.

Therefore, regardless of whether we are doing what you would like or not in the area of conservation and renewables, the urgency remains that in the year 2000, if we have not found a substantial replacement for the reserves that are being depleted, this Nation will be more heavily dependent than it ought to be.

It will still be heavily dependent, incidentally, even if these areas have substantial amounts of oil in them.

Senator WIRTH. The problem that I have is, why does the Administration come in with this enormous sense of urgency, with no sense of urgency on photovoltaics. That was not demonstration projects; that was basic research.

We talked about the CAFE standards earlier. We do not have to go into this, Mr. Secretary, at this point. That is really a separate issue, but it is relevant to this.

Secretary HODEL. It is a difference of opinion, Senator, on what the appropriate level of government activity is and what the potential payoffs are.

Senator WIRTH. That is very true. I do not know why we should be allowing automobiles now to become less efficient rather than more, at a time when we are consuming more oil than we did a year ago. It just does not make any sense to me.

That is just a nonsensical thing to do when you are coming in and asking us to go ahead in this area.

Let me ask you another part of this as well. Moving in this direction, can you give us an estimate for the record of what reserves already exist on the North Slope of Alaska.

Secretary HODEL. We should probably supply for the record the reserves that have been found and proven up in the Prudhoe area and adjacent to Prudhoe, in order to give some kind of basis for the reduction in production from Prudhoe.

Senator WIRTH. What I just wanted to point out and the purpose of this, Mr. Chairman, is that there are, according to materials that have been made available from the Alaska Department of Natural Resources in January of 1987, very, very significant reserves now.

For example, it shows the West Sac—I believe that is the pronunciation—as having estimated reserves of 20 billion barrels, of the Kuparuk River unit as having reserves of 3 billion barrels.

And again, your comment on that. If we have these very, very significant reserves, does that raise any question about the urgency that you all are suggesting?

I pursued the questions, Mr. Chairman, related to the overall energy policy, and I might now like to return, in the time remaining to me, to the questions related to the draft report and the final report and the differences between the two.

Might we ask you, Mr. Secretary, to provide to the Committee for the record a side by side of the draft report and the final report? And give us the reasons, in your analysis, in that side by side of why major changes were made?

I ask that in relation to a number of specific areas that I might mention at this point. The industry press reported at the time that the final report came out that the political appointees—this is from the industry press—the political appointees at Interior were surprised and unhappy with the draft's assessment of environmental impacts, and that the political appointees at Interior worked overtime to minimize the discussion of those impacts in the final report; they succeeded in large part, and then they go on to talk about a number of the changes that were made.

And I would like it very much if you could come back to us with an analysis of these. And let me give you the specifics that have been mentioned.

First, in the area of water, that the analysis was given in the draft, but not in the final report, that as much as 15 million gallons of water may be needed to drill one exploratory well. Fresh water would also be needed for the construction of airstrips and ice roads and for the 1500 people who would live in the area at the height of production.

However, there are very few fresh water sources in the Coastal Plain, and as a result oil companies would have to install desalination devices, develop reservoirs or find other sources of water. This has not been adequately covered in the final report.

The second area, is related to gravel. As much as 50 million cubic yards of gravel would be needed for construction of drill pads and oil pipeline housing facilities and other structures. The EIS goes on to discuss the need for airstrips, roads, and so on, and that there are very few areas where gravel could be mined without causing significant impacts—the second area, Mr. Secretary, where the final report does not address impacts adequately, and where the EIS minimized the discussion of impacts.

Third, there have been some allegations related to core calving areas. The draft report stated—and this was touched on very briefly in earlier discussions here, but you might give us a more extensive answer to the questions raised—the draft report stated that the Porcupine caribou herd migrates into the Coastal Plain during the summer for calving. The draft report also identified areas that appear to be heavily used for calving and denoted these—this is important—as "core calving areas."

78 percent of the Porcupine caribou herd's core calving area falls within the Coastal Plain and was designated as a category one resource. As you know, the Fish and Wildlife Service rates habitat areas on a scale of one to four. Category one resources are described as habitat areas that are of high value and which are unique and irreplaceable. Designation of habitat, such as category one, means that there is a greater likelihood that Federal agencies will not issue permits or licenses for action that will significantly affect the resource.

What is notable is that, while the core calving areas were designated in the draft report as a category one area, any reference to "core calving areas" was left out of the final report and there are no references in the FLEIS to category one areas. Why is that?

And finally, just a contradiction that may exist here. There was discussion earlier about the muskoxen. A question was asked, I believe, by either Senator Bumpers or Senator Johnston. And Secretary Horn said that the impact on the muskoxen would be moderate to minimal.

However, the impact in the report that was initially issued said that there was a major negative influence, significantly different from the answer given to us by Secretary Horn.

A final item that was left out, apparently—if we might have this in terms of the side by side—was the suggestion earlier that there be an examination of the cumulative impacts of oil and gas developments. That that was not found in the draft report. The final report has a cursory study of cumulative impacts. Why was there a change between draft and final? And why was this issue not better addressed?

I know that you have been looking at this very, very carefully, Mr. Secretary. And I think just for the purposes of our decisionmaking, if we could have as clear an exposition as possible from you of the major differences between the draft report and the final report, to answer the allegations that have been made in the trade press—and again, I would use advisedly the word "allegation," as I would like to do—about a concerted effort to minimize the explosition of environmental impacts on the final EZS.

As a final note, Secretary Horn said earlier that Prudhoe Bay is a model of air and quality control, as I remember his discussion earlier with Senator Murkowski. Is it the case, Secretary Horn, that we only started to collect air quality information last year, and that in fact water quality information has not been systematically collected?

Mr. Horn. My understanding is that there has been monitoring of operations at Prudhoe dating back into the late 1970's. The monitoring of air and water quality programs falls within the purview of State DEC and Federal EPA, which have had programs on the books since the early 1970's.

Senator Wirth. The information that was available to me was that the systematic collection of information on air quality began only last year, that there has not been this kind of systematic collection of information related to water quality.

And maybe you could clarify that for the record for us. For you to state that Prudhoe Bay and the way in which this is done is a model may well be the case, but only if in fact we have all the base data on which to demonstrate that in fact it is a model and that that has been very carefully done.

I might also bring to your attention the piece done by the Congressional Research Service talking about toxic and hazardous waste spills and hazardous and non-hazardous wastes. That is the Congressional Research Study, page 6, and that was made available to the members of the Committee and had been prepared at the request of Chairman Johnston, dated May 22, 1987.

[The report follows:]

87-490 ENR

CRS REPORT FOR CONGRESS

ENVIRONMENTAL EFFECTS OF ENERGY DEVELOPMENT IN THE ARCTIC NATIONAL WILDLIFE REFUGE: A CRITIQUE OF THE FINAL LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

Prepared at the Request of:
Honorable J. Bennett Johnston, Chairman
for the use of the

COMMITTEE ON ENERGY AND
NATURAL RESOURCES
UNITED STATES SENATE

by
M. Lynne Corn, Analyst (Coordinator)
John Blodgett, Specialist
Eugene H. Buck, Specialist
Claudia Copeland, Specialist
Mark R. Dillenbeck, Analyst
Environment and Natural Resources Policy Division

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SUMMARY

The coastal plain of Alaska is a center of oil development: Prudhoe Bay is the site of the largest field of economically recoverable oil in the United States. To the east, there may be similar fields. But this area is part of the Arctic National Wildlife Refuge (ANWR), an area as rich and exciting biologically as it is geologically. Congress now faces the choice of whether ANWR can or should be developed for its energy potential and, if so, whether its rich biological diversity and unique ecosystem can be protected in the process.

The Department of the Interior released its study of ANWR's resources on April 20, 1987. In this study, or Final Legislative Environmental Impact Statement (FLEIS), the Secretary recommended full leasing of the entire area, and rejected four other options. The FLEIS considered the prospects for oil and gas in the area, the likelihood of an economic field, and the contribution of a major discovery to the national economy and national security. It also considered the environmental consequences of energy development on the coastal plain. In general, the FLEIS concluded that it was not necessary to choose between energy development and continued protection of other resources, such as plants and animals, or clean air and clean water, in the area because impacts of development could be minimized and the biological resources protected.

Both the data base and the conclusions of the FLEIS concerning effects on organisms and on air and water quality were widely criticized: some critics argued that it was unduly pessimistic, others that it minimized the effects of development. Because of the criticism, the Congressional Research Service was asked to examine the analysis of environmental consequences of energy development in ANWR.

In responding to this request, this report does not examine the balancing of other national priorities against these effects, or the validity of the geological data or the economic assumptions. Instead, it considers the validity and completeness of the environmental and biological data and related policy analysis in the FLEIS and its associated documents. It concludes that, while the compilation of background biological data surpasses all previous efforts in this field, the environmental analysis does not relate impacts to the statutory mandates of ANWR. The omission results in three problems for decision-makers.

1. The extensive data supplied on certain species causes the FLEIS to focuses on the obvious but it may obscure impacts on the ecosystem as a whole.

2. The FLEIS obscures possibilities for intermediate options which Congress may wish to consider and which may be compatible with the purposes of ANWR.

3. The FLEIS contains some basic and confusing ambiguities concerning the long-term future of ANWR. Some sections imply a return to a natural state, while other sections indicate the likelihood of continuing development in the area. This ambiguity results in a confusion of long-term and short-term effects, and underlies some of the analytical problems discussed in this report.

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ENVIRONMENTAL EFFECTS OF ENERGY DEVELOPMENT IN THE ARCTIC NATIONAL WILDLIFE REFUGE: A CRITIQUE OF THE FINAL LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

INTRODUCTION

The Alaska National Interest Lands Conservation Act (ANILCA; P.L. 96-487) in Section 1002 required that the Department of the Interior study the animal and plant resources and the oil and gas potential of a designated portion of the coastal plain of the Arctic National Wildlife Refuge (ANWR) and recommend to Congress whether to develop this "1002 area." Section 1003 prohibited energy development unless authorized by Congress. Congress now must choose among three basic options: allowing leasing, forbidding it through wilderness designations, or taking no action.

The Final Legislative Environmental Impact Statement (FLEIS) was released on April 20, 1987; a second Volume contained major comments on the Draft LEIS. It presented background information, and explained the Secretary's choice of a full leasing option and his rejection of four other options. While some commentors supported the Draft LEIS, many comments were critical, particularly concerning its assessment of environmental effects of exploration, development, and production. Some critics argued that the Draft's environmental predictions were too pessimistic, and others argued the reverse.

The FLEIS examines both the prospects for oil and the environmental consequences of developing it. Some of the environmental issues are strongly debated. They are discussed in the FLEIS at varying levels of adequacy. This report examines several issue areas, both general and specific. The major findings are listed below.

1. Overview: the FLEIS and the many supporting volumes provide extensive background data on some species. However, the FLEIS does not include substantial analysis of several areas such as certain comparative data, post-production effects, analysis of potential conflicts with state laws, or the post-production state of the coastal plain.

2. Air quality: the FLEIS argues that air quality will be affected only minimally. Yet comparative and baseline data are scarce, and their incompleteness may make analysis more difficult.

3. Water Supply: the FLEIS recognizes that water supply is an important issue, and has expanded its coverage of the subject in comparison to the Draft LEIS. However, the FLEIS lacks a quantitative comparison of the amounts required for development with amounts available on the coastal plain. The FLEIS provides little information on how the water shortage can be addressed and still protect scarce winter water supplies, nor on how water restrictions can be enforced.

4. Water Pollution: the discussion of disposal of various wastes

through reinjection, closure of reserve pits, and incineration leaves analytical gaps.

5. Infrastructure: the requirements for infrastructure are clearly presented, but some aspects, such as the treatment of service centers and of garbage, still leave analytical gaps. Rehabilitation of gravel pit sites is as yet unproven.

6. Effects on animals: extensive information is supplied about some species. Data regarding effects on caribou are among the most controversial aspects of the FLEIS; emphasis on this species may have obscured effects on other species. Effects on carnivores and scavengers are unclear and may warrant further study.

7. Human Access: human access, both legal and illegal, will increase in the 1002 area if Congress authorizes development. Enforcement of hunting and fishing regulations is likely to be difficult in such a remote area.

8. Policy Choices: the failure of the FLEIS to relate impacts clearly to the statutory mandates of ANWR may obscure policy choices.

OVERVIEW OF THE FLEIS

The FLEIS has certain general strengths and weaknesses which are common to many sections of the document. These strengths and weaknesses are especially significant, given the Secretary's request (p. 189) that the FLEIS be adopted statutorily as the programmatic EIS for a leasing program in the 1002 area.

Strengths of FLEIS Analysis

Biological Research. Arctic biology is not as well studied as temperate zone biology. Prospects of development in ANWR stimulated research projects in botany, zoology, etc., that might never have occurred otherwise. The commitment of many Fish and Wildlife Service (FWS) personnel, new research, and the extensive literature review of arctic wildlife are major contributions to this field. The result is an extensive data base on some species, particularly caribou, but also certain other vertebrates. Without this increased information, congressional decision-making would be far more difficult.

Energy Estimates. The methods of estimating the oil present and producible are seen as typical of the best that can be achieved in a frontier area, especially given the limitations ANILCA imposed on the methods. However, the limitations result in a lack of more precise information about any oil deposits which makes predictions of effects speculative. (This report will not analyze the energy predictions or economic assumptions contained in the FLEIS or its balancing of various national interests in making such a leasing decision.)

Omissions of FLEIS Analysis

The FLEIS omitted or treated several general subjects minimally. Further research in these areas might lead to a more well informed decision. More specific problems and gaps in the data are treated below under individual issues.

Comparative and Historical Data. In some cases, the FLEIS draws extensively on activities at Prudhoe Bay, Kuparuk, or the Trans Alaska Pipeline (TAPS), particularly concerning geology and the increase in the caribou herd around Prudhoe. On other subjects, it does not make such comparisons, or provides insufficient detail. As a result, questions remain regarding effects on air and water quality, enforcement problems, and garbage handling (especially of scavenger attractants) are examples. Other questions include: Would changes be made in support service contracts in the 1002 area to prevent a repetition of problems elsewhere? Has water "poaching" been a problem at Prudhoe, and how have managers responded? How has rehabilitation worked for gravel pits at Prudhoe? In building TAPS, gravel pits beside streams caused the water table to drop. Has the water table recovered? What lessons were learned from site cleanup at the National Petroleum Reserve-Alaska (NPRA), and how would cleanup at the 1002 area differ, given its status as a refuge? What effect did the loss of riparian vegetation in any other arctic projects have on animals?

Post-Production Effects. The FLEIS definitions of environmental effects (p. 107) generally equate shorter term, widespread effects with longer term, more local effects. As a result, the FLEIS rarely describes which effects might continue beyond the life of the field. For example, the risk of failure of a sealed reserve pit (however great or small) continues indefinitely after development. The alternative, reinjection of muds below permafrost, might also pose a long term pollution risk. Leaving roads in place would also have major effects. These and other effects might last long after the fields are drained, but none are described comprehensively.

State Law. The FLEIS gave minimal treatment to applications of State law. The omission may have become more critical because of a recent Supreme Court decision on mining at Big Sur, California (California Coastal Commission v. Granite Rock Company; March 24, 1987). The decision affirmed that Federal land management laws do not automatically pre-empt more stringent State environmental laws. The case has potentially serious consequences in the ANWR debate: the State of Alaska, while supporting energy leasing, commented that it "strongly recommended" that leasing be deferred for at least 10 years in the concentrated calving area of the Porcupine Caribou Herd. Conflicts, if any, among the "36 Federal laws, 5 State of Alaska laws, and 111 separate regulations" (p. 198) should be described and weighed.

Data Needs

Some commentors argued that more data were needed before Congress makes a decision about the 1002 area. Among the factors which might be studied are not only the actual presence of oil, but also more analysis of predator and prey relationships, winter sources of water during the peak demand at exploration, a quantification of reserved water rights for Refuge purposes, and a detailed computerized mapping of resources. Congress may wish to consider whether agencies should be directed to gather more data as debate proceeds, or before a final comprehensive decision is made.

Policy Options for Long-term Plans Affecting FLEIS Conclusions

The FLEIS avoids, or contradicts itself on, the area's long-term future after production ceases in several decades. At least three future options seem possible: (1) the FWS would make strenuous efforts to restore the area to its natural state; (2) the area would be a base for production of onshore natural gas (which is not now economical); or (3) the area would be a base for offshore oil production. Restoring the area might require removing all hardware and eradicating roads, drilling pads, etc. Alternatively, the industrial base could be left, with an enlarged human population, roads, airfields, etc. Would restoring the area preclude offshore energy development? There is no assessment of secondary consequences of this policy option, since the choice is never clearly made.

AIR QUALITY

Conceivably, air pollution could have two kinds of long-term impacts on ANWR. First, air pollution during exploration and production might affect certain plant species, thereby changing the distribution of species beyond the time when oil extraction ceased. Second, air pollution might increase acid precipitation or contribute to arctic haze that could have post-production impacts. Either effect is speculative, and the chance of substantial effects resulting from emissions in this one area seems low; however, the cumulative air quality impacts of circumpolar development remains a subject of debate. Future studies at Prudhoe Bay and other North Slope oil fields might provide further information on air quality impacts, though limited pre-development monitoring provides few baselines.

The FLEIS concludes that air pollution resulting from development of ANWR would be minor and transitory. Discussion is considerably expanded from the Draft, and includes one year (1979-1980) of available air quality data from Prudhoe Bay (included in the comments on the Draft LEIS by Standard Oil Company). Newly initiated monitoring at Prudhoe may provide further insights into potential air quality problems. One or more comments on the Draft LEIS identified the following air quality concerns:

Nitrogen oxides (NO_x). By far the largest emissions of air pollutants would be of NO_x. Although ambient levels would not be expected to exceed national standards, emissions might contribute to ozone formation, acid rain, and arctic haze. The FLEIS indicates that ozone formation would be minimal because of the low light levels most of the year; that acid rain is not a problem (though the report focuses on sulfur dioxide as a source, not NO_x); and that Prudhoe Bay emissions appear not to contribute to arctic haze (though the evidence is based on casual observation only).

Ozone. Although expected levels of ozone would be very low, at least one commentor expressed concern that it might nevertheless adversely affect plants in this fragile environment.

Total Suspended Particulates (TSP). Dust and fugitive emissions have, according to Prudhoe Bay data, occasionally exceeded ambient TSP standards during windstorms. However, the only comment in the FLEIS was that dust deposition on snow along roads caused early melting. Several commentors also noted that "start-up and upset flaring" produced black smoke, sometimes for weeks, but nothing was said of any particular adverse effects.

WATER RESOURCES

ANILCA added several explicit and primary purposes regarding water in ANWR. Section 302(1)(B) states that the purposes shall include ensuring "to the maximum extent practicable . . . water quality and necessary water quantity within the refuge." Quantification and adequacy of reserved water rights for ANWR in general and the 1002 area in particular would appear to be implied in this statement, but the FLEIS does not discuss the problem, even though oil exploration and development make significant demands for water. These demands may affect the physical and biological environment in two ways: through removal of water for industrial and domestic use, and through potential water pollution.

Water Supply and Demand. The FLEIS presents little information on anticipated water requirements for oil exploration, development, and production, although the volumes needed are apparently enormous, as much as 15 million gallons of water per exploratory well (p. 111). It acknowledges that water resources in the 1002 area have not been intensively studied, but provides little data to permit comparison of needs and supply.

Although no total water requirement estimates are presented, the FLEIS predicts that one-third less would be needed under Alternative B, limited leasing; presumably still less would be needed (the extent is not quantified) under Alternative C, the further exploration option.

The FLEIS states repeatedly that fresh water is limited in the 1002 area: only a few large lakes and shallow thaw lakes and a few accessible streams and springs are available in winter. The FLEIS states that, in the production phase, one or more plants to desalinate sea water would be built. However, it does not indicate where water for the peak demand during exploration and development would be obtained, nor are the impacts of a desalination plant discussed.

There are several options for increasing water supply: excavating deep pools in lakes, rivers, and streams; insulating ponds to prevent freezing; erecting snow fences to trap snow which could be used with snow melters; and converting gravel extraction pits to reservoirs. These methods have reportedly been successfully used for exploration and development elsewhere in the arctic, where fresh water resources are not as scarce, but supporting evidence is not presented. The FLEIS does not compare the physical and biological consequences of such methods for the 1002 area with other North Slope developments. The FLEIS takes the position that these are primarily engineering problems, while some observers contend that the issue has significant consequences that have not yet been addressed.

While solutions to water supply problems may be site-specific, a more thorough analysis of industrial and domestic requirements of potential water supply and associated environmental impacts is needed for informed decision-making.

Potential Water Pollution. The FLEIS finds that both full and limited leasing would have major effects on water quality. Major effects would encompass (1) "dedicated industrial use of the limited natural fresh-water sources" in the area and (2) potential for stream pollution lasting beyond the life of the project, due to construction and operations (including land erosion), as well as operational spills of oil and toxic materials. Effects on water quality are deemed unavoidable, lasting beyond the life of the project, and the most significant consequence for the physical environment.

The 1002 area is believed to be almost entirely underlain by permafrost, an impermeable zone beneath the surface, estimated at 800 to 1000 feet thick. Because water is held at the surface by the permafrost, about 99% of the 1002 area can be classified as wetlands, which serve multiple functions including providing habitat for fish and wildlife. Permafrost has two important effects on water issues. First, potential groundwater sources may be limited, since groundwaters beneath the permafrost are believed to be brackish. Second, toxic or hazardous waste spills would tend to concentrate above the permafrost zone, rapidly moving laterally to pollute rivers and streams, rather than percolating downward. The FLEIS does not analyze these issues or the potential effects of oil development activity on the permafrost, such as possible melting.

Wastes and Spills. Oil development and production involves many liquid wastes, such as brines, spent acids or caustics, corrosion inhibitors, and hydrocarbon products. Even in less fragile environments, proper waste disposal is critical. One key category of waste is drilling muds and cuttings. At other North Slope sites, water quality contamination may have resulted from leaching, breaching, or overtopping of reserve pits. The FLEIS recommends that such incidents be minimized by reinjecting drilling mud and other wastes where geologically feasible. It also indicates that solid wastes generated from oil development would probably require an incineration unit, a landfill, and an oily waste pit and that hazardous wastes should be removed to an approved disposal site. The likely volumes of hazardous and non-hazardous wastes are not identified, nor are locations for hazardous waste disposal or a solid waste incineration unit. However, a thorough siting analysis is a prerequisite for minimizing environmental damage.

The full leasing, limited leasing, and further exploration alternatives in the FLEIS predict an "unknown number (possibly hundreds) of minor spills (diesel fuel, oil, antifreeze, etc.)" from vehicle and equipment operation, likely to cause contamination of water. While the FLEIS terms these spills unavoidable, it also predicts that cumulative effects would not be significant, based on North Slope experience. The oil industry asserts that past spills were cleaned up quickly and that no major, cumulative impacts occurred. Thus, this experience is a model for future development in the 1002 area. Other observers dispute industry's claims.

Possible Effects of Quantity and Quality Concerns. The necessary water removal and possible pollution could have significant impacts on aquatic and marine species and special habitats.

Marine Mammals. Recent studies show that endangered bowhead whales do not mature and reproduce as early as previously thought. Additional precautions to prevent offshore impacts of petroleum development in the 1002 area are not outlined in the FLEIS, but may be required to increase protection afforded this species.

Fish. Effects on freshwater and coastal fish result primarily from (1) physical alteration of aquatic habitat (water withdrawal in critical areas at critical times, blasting, gravel removal and resulting increased sedimentation, creation of stream barriers through poor culvert design, water intake structures, and stream channelization, and of coastal barriers through erection of marine docks and causeways, etc.); (2) increased mortality from blasting and angling; and (3) chemical alteration of aquatic habitats (oil spills, drilling mud contamination, sewage and wastewater disposal, other contaminants, etc.).

The FLEIS understates the substantial winter concentration of freshwater fish in the extremely scarce unfrozen water. Suitable overwintering habitat for freshwater fish is very restricted in the 1002 area, and the environmental significance of oil development on this unique situation has not been studied extensively. Since winter habitat is severely restricted, unimpeded migration of fish to and from overwintering sites is crucial to population survival within each drainage system.

The FLEIS addresses chemical habitat alteration, but aquatic habitats in this area are so fragile and arctic fish populations so minimally productive that any accident could have significant long-term impacts.

Special Aquatic Habitats. Sadlerochit Spring is "one of the largest perennial springs on the North Slope" (p. 19). It is an overwintering habitat for fish, and the northernmost limit for many plants and birds; it is used year-round by muskoxen. In the exploratory phase, pressure to use this water may be intense, especially since there is no salt water alternative nearby. The FLEIS proposes no surface occupancy for energy exploration or development, but does not clearly address water withdrawal. However, references in the Draft LEIS (p. 104) to studying permissible and safe water withdrawal have been removed in the FLEIS. Whether this suggests that withdrawal may be permitted, but without such a study, or whether the removal means that it would be forbidden, is not clear. Allowed or not, water "poaching" may occur. The FLEIS neither discusses enforcement of regulations in this area, nor compares any needed regulations with experience at other arctic sites.

Enforcement. Specific water use permit provisions focused on preventing physical alteration may be insufficient to prevent destruction of fish and aquatic habitat, given the isolation of ANWR. Of considerable concern is how permit requirements might be enforced by the various responsible agencies when and if numerous drilling operations with various independent subcontractors are working in the area. Problems were encountered at Prudhoe Bay when independent water haulers dewatered fish overwintering sites despite permit restrictions to the contrary.

INFRASTRUCTURE AND HUMAN ACCESS

Development and production in the 1002 study area would require major infrastructure investments and would be accompanied by problems associated with increased human access. The FLEIS states that visual impacts of development would be "major and long term" and that oil production would "largely destroy wilderness values and alter or destroy scenic values on a year-round basis".

Infrastructure Development and Effects

Exploration Phase. Further seismic exploration would be required to complement existing studies. This work can locally disturb animals and damage vegetation, mainly as a result of increased travel and human presence in the 1002 area.

Seismic studies would probably be followed by exploratory drilling, requiring roads, drilling pads, and an airstrip. Wells that are less than 10,000 feet deep can be completed in one season and the roads, pads and airstrip can be built of ice with probably minor effects. However, deeper wells may require year-round structures made of gravel.

Production Phase. The infrastructure needed for production includes a central production facility, drilling pads, roads, airstrips, pipelines and one or two marine facilities, with large water and gravel requirements. At the mean expectation for oil discovery, over 5000 acres would be directly covered by pads, roads, airstrips, etc. Pipelines are generally constructed from gravel pads but the impact on surrounding tundra vegetation can be minimized if the lines are constructed from snow pads.

Another 7000 acres would be subject to secondary effects such as gravel and dust deposition, altered snow melt and erosion patterns and pollution. In all, 0.8% of the 1002 area is likely to be directly affected. Dust and gravel spray from the roads would result in increased surface temperature and early snow melt up to 100 feet from the road. Vegetational changes and soil settling would occur.

Roads and pads can also cause inadequate drainage and alteration of natural water courses, resulting in ponding, icing and subsurface seepage. Drainage design and placement has proven difficult on the North Slope. On the North Slope, water from reserve pits is sometimes used on roads in order to reduce dust. Barite and heavy metals in these fluids lead to dust which is high in barium, chromium, lead, and other metals. Since water is scarce in the 1002 area, "watering" roads in this manner would be more likely than in other North Slope areas. The FLEIS says little about the possible impacts of these pollutants.

There is likely to be significant off road vehicle traffic within oil fields. The Alaska Department of Natural Resources permits only special vehicles to travel on tundra during spring and summer in order to minimize damage. In the central portion of Prudhoe Bay, 0.13% of the field was deeply rutted and 4.27% was covered by tracks, gravel and construction debris. The 1002 area may be more strictly regulated.

Other development sites on the North Slope have privately operated service areas for tire repair, supplying drilling muds, mechanical repair, etc. This site at Prudhoe Bay is about 600 acres, and critics have charged that environmental protection in the area is poor. A similar, slightly smaller site would be required for the coastal plain of ANWR. The FLEIS does not discuss private service areas.

Gravel. A major concern associated with development has been the availability of gravel and the impacts of exploitation of gravel deposits in the 1002 area. The FLEIS estimates that 500-750 acres would have to be mined at as many as 15 locations in ANWR. River floodplains are the most common sources for gravel. Little damage is likely if intermittent streams and channels are used, but these areas would probably not produce enough material. Thus, large open pit mines near rivers and the exploitation of upland sites would both be necessary. Upland sites would be particularly susceptible to erosion and sedimentation. Significant areas of two rare vegetation types, riparian willow and Dryas river terrace vegetation, would be destroyed. In addition, there would be long term visual impacts from mining. Rehabilitation has been tried only on a limited basis.

Garbage. Improper garbage disposal serves as a major attractant to foxes, polar bears, brown bears, and other scavengers. Fox populations can increase near oil fields resulting in increased predation on birds and small mammals. Brown bears that are attracted to garbage are usually shot because of the threat they may pose to humans. Other scavengers (e.g., wolves, ravens, gulls) may also increase if garbage access is allowed.

Rehabilitation

Following the end of production, site rehabilitation would take place (unless a facility, such as a road, is to remain for use in gas production or offshore oil development). However, successful rehabilitation techniques have not yet been developed for areas north of the Brooks Range. Presumably efforts would involve the removal of all existing structures and the closure of reserve pits. The rehabilitation of pads, roads, and airstrips would be difficult. The removal of gravel and the reapplication of soil may not be practical.

Impacts on Animals

Caribou. The Draft LEIS was criticized for its treatment of the caribou core calving area. Environmental groups particularly cautioned against the Draft's comparisons of the Porcupine Caribou Herd (PCH) and the Central Arctic Herd (CAH); the latter is found at Prudhoe Bay and vicinity. Some lessons can be learned from the experience at Prudhoe. For example, past research on pipeline design may aid in improving the ability of caribou to cross pipelines and roads; bulls will approach pipelines, but cows and calves are reluctant to do so.

However, CAH animals need not cross the pipeline during their life cycle; PCH caribou will have to. CAH caribou can become accustomed to humans throughout the year, but the more remote and extensive annual range of the PCH brings them into contact humans less frequently. Conservation groups also argued that the growth of the CAH has been due mainly to the death of wolves from poaching and rabies, rather than to any benefit from association with energy development. Thus, they claimed that the Draft LEIS underestimated the potential damage to the Porcupine Caribou Herd.

Between the Draft and Final LEIS, certain changes were made to maps showing distributions of the "core" caribou calving area. In addition, the name of this area was changed to the "concentrated" calving area, to reflect the FWS judgment that the upper Jago River area was not "unique and irreplaceable on a national basis or in the ecoregion" as was stated in the Draft LEIS. The changes in the maps showing concentrated calving shifted the area to the south, away from areas with promising oil prospects. Because the changes were based on small scale maps supplemented by the recollections of a researcher whose large scale maps were destroyed in a fire, these changes have been subject to widespread criticism and suspicion.

Industry commentors made two main arguments: (1) since caribou select many areas for concentrated calving, and even fail to concentrate in some years, the loss of any core area is irrelevant or minimally damaging because cows could use many other areas; and/or (2) this herd is actually limited by predation, both human and non-human, so habitat loss is irrelevant. Both arguments conclude that energy development would not damage the caribou.

At present, the accuracy of these two assertions cannot be determined. However, even if true, they do not necessarily mean that oil development would have no impact on the herd. The first assertion essentially says that, depending on a variety of factors, cows make choices for optimal calving habitat which may vary from one year to another.[1] Studies show that reproductive success of cows is higher in concentrated calving areas.

In years with early springs, the herd calves more to the north and west, and in years with late springs, they calve more to the south and east. In years of average weather, the area with apparently the best combination of factors would be occupied with energy development. To avoid disturbance, cows would choose a habitat with conditions which are less favorable in such a year. If spring is late (most calving to the south and east), oil development may have little or no effect on calving. If spring is early, cows would presumably have to move through or around developed areas, and the effect would be harder to predict. Since variation in spring weather can be predicted a few days or perhaps weeks in advance, this argument would suggest that mitigation for energy effects on calving might vary from one year to another, a variable mitigation strategy not mentioned in the FLEIS.

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[1] There are also factors which do not vary annually, such as a preferred distance from suitable wolf denning areas and insect relief areas, substrate color which will camouflage young calves from eagles, etc.

The second argument, that caribou are predator-limited, rather than habitat-limited, also does not mean that energy development would not affect the herd. Energy development could alter the imputed limiting factor (predation). This argument suggests that the FWS mitigation strategy may be misdirected toward habitat, rather than predation. Hunting (subsistence, legal, and illegal), accidental kills, and predator populations would all have to be carefully controlled in order to avoid affecting predation levels. Indeed, one commentor suggests that predators (i.e., wolves) should be killed in order to maintain caribou populations, if development forces the herd to use less favorable habitat (i.e., closer to wolf dens; Appendix, p. 0-37). Predator management to maintain game populations is not addressed in the FLEIS.

Other Mammals. The focus on caribou by the FLEIS and practically all commentors has obscured consideration of other species. Both polar and brown (grizzly) bears, with much lower population levels and reproductive rates, are affected by human activities. Studies in other areas (e.g., Yellowstone) have shown grizzlies' sensitivity to human presence. The Marine Mammal Commission recommended a program of actively frightening polar bears and driving them from camps; how this might affect other species is not clear. The risk to polar bears warrants further research. For muskox, the times of maximum physiological stress occurs in winter, when energy development is at a peak. There have been no studies on the effects of development on muskoxen.

Birds. Nearly all of the bird species in the area are present for only a few critical months. Many species feed in aquatic or marine habitats. Pollutants or toxics entering a major stream might alter a complex food web. Effects of pollutants on the small plants and invertebrates at the base of the food chain may affect species with no direct contact with the original contamination. Uncertain effects of pollutants on the food web, and the minimal discussion of garbage control (which increases populations of some predators) make it difficult to predict the effects of development on migratory birds.

Effects of Human Access

The development of North Slope oil has greatly increased fishing, sport and subsistence hunting, and other activities along the haul road for TAPS. Access is restricted north of the Brooks Range, but enforcement begins only at the production field entrance.

Hunting Pressure. Despite access restrictions, hunting is widespread on the North Slope. Oil companies do not allow their employees to have firearms; however, sub-contractors are thought to be primarily responsible for poaching problems along the haul route. The local impacts on wolves, gyrfalcons and peregrine falcons have been serious; poaching occurs even without development. In addition, subsistence hunting is prohibited within five to ten miles of oil fields. Without more effective regulation, the development of the 1002 area will exacerbate existing problems. Hunting pressure (subsistence, sport, and illegal) depends on the effective enforcement of restrictions on access and on hunting and fishing limits, but the FLEIS does not comment on methods of improving enforcement or on who will pay for it.

Sport Fishing Pressure. The FLEIS addresses concerns for increased angling, but fish overwintering habitat is so restricted and fish stocks so minimally productive that any increased sport harvest beyond current subsistence use may seriously deplete this resource. The FLEIS does not address potential enforcement problems in this isolated area.

Noise. Noise is a major impact of development because it carries easily in the arctic's increased air density. The reaction of wildlife ranges from displacement to habituation. Depending on the location of the source, it may frighten or stampede animals, perhaps resulting in injury or predation. It may also startle nesting birds, thus allowing predators to take eggs or nestlings. Muskoxen, denning polar bears, and particularly snow geese are among several species described as sensitive to such disturbance. Repeated, regular noises offer the best opportunity for habituation. The FLEIS characterizes noise impacts associated with drilling, aircraft and traffic as "major".

CHOICES ON THE FUTURE USES OF THE 1002 AREA

The FLEIS (p. 1) opens by defining the four purposes of ANWR as redefined by ANILCA:

(i) To conserve fish and wildlife populations and habitats in their natural diversity . . . ;
(ii) To fulfill international treaty obligations . . . with respect to fish and wildlife and their habitats;
(iii) To provide . . . the opportunity for continued subsistence uses by local residents; and
(iv) To ensure, to the maximum extent practicable . . . , water quality and necessary water quantity within the refuge.

In reviewing the impacts of alternative actions, however, the FLEIS does not summarize impacts in terms of these four purposes, but rather in terms of the physical, biological, and human environments (page 166). In recommending Full Leasing, the Secretary focused his comments only on the two "major" impacts for the biological environment, the Porcupine Caribou Herd and muskox. However, the FLEIS does identify several other "major" impacts, including the impact on water (the fourth purpose of ANWR) and on subsistence (the third purpose). Water is scarcely mentioned in the discussion of the recommended action, while subsistence is discussed under a subsection rejecting Wilderness Designation.

This failure to relate impacts clearly to the purposes of ANWR gives rise to three problems in analyzing the potential impacts of development in the 1002 area.

First, it focuses attention on the obvious--caribou and muskox--while obscuring impacts on the ecosystem as a whole.

Second, it obscures possibilities for options involving exploration or limited or phased development that may be compatible (or more nearly compatible) with the purposes of ANWR, and instead focuses on the impacts on the area as a de facto wilderness. Yet, in rejecting Wilderness Designation, the Secretary concludes that because of "the existence of extensive lands set aside for wilderness and other preservation purposes in this area and in Alaska, the 1002 area's value as statutory wilderness is not unique." However, the FLEIS notes (p. 46) that the "Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the arctic ecosystems in North America," of which the "1002 area is the most biologically productive part . . . and is the center of wildlife activity."

And third, it leads to confusion of short-term versus long-term effects. The FLEIS itself seems ambivalent, speaking at times about "rehabilitation" and "restoration," but also about "the long-term commitment of this area to industrial use based on oil and gas development." It is therefore unclear whether the Department visualizes the 1002 area as an integral part of a wildlife refuge that is being temporarily intruded upon, or as a base on which to develop the infrastructure for long-term energy exploitation. The FLEIS does note (p. 154) that under the No Action Alternative, ANWR could be used for the development of offshore resources if the activity is compatible with the purposes of the Refuge.

Considering the purposes of the wildlife refuge and values associated with alternatives--primarily, wilderness and energy development--allows one to identify a sequence of decisions and attendant information needs.

If one believes the area should be wilderness regardless of its potential for oil development, then no further information would be needed for making that choice.

If one believes that wilderness values should be weighed against oil potential, then the decision would have to await exploratory data on oil (and gas) resources--how much and where they are.

If one believes that the area should be preserved as a wildlife refuge and that oil should be developed only if it would not significantly compromise ANWR's statutory purposes, then a decision might await exploratory data on oil (and gas) resources. Data on the size, extent, and nature (e.g., sulfur content) of the resource would then permit an evaluation of potential adverse impacts that would be much less speculative than the current LEIS.

However, if one believes that oil production can be consistent with ANWR's purposes as a refuge, then one might be willing to commit to full development at this time. (One might base this decision on the belief that experiences at Prudhoe Bay and Kuparuk demonstrate the compatibility of oil production and wildlife.) Even in this case, some further information would be highly useful: (1) implications of important differences between the 1002 area and Prudhoe Bay and Kuparuk (e.g., the relative shortage of water); (2) improved biological mapping of the 1002 area so that the effects of resource development could be assessed as exploration and development progressed; and (3) research on techniques of restoration, which the FLEIS notes are generally unknown for this area.

Finally, if one believes that the limited area that would be required for oil production should be devoted to development regardless of its effects on wildlife, then one might nevertheless wish to research mitigation techniques to minimize those impacts. Obviously, the size and location of the areas affected could only be determined by exploration.

Senator WIRTH. Perhaps I might ask you for the record as well to give us an answer to the questions on toxic and hazardous waste spills that appear in paragraph 4 on page 6. It is just for the record, Mr. Chairman, so we are sure to have that.

And on paragraph 5, on likely volumes of hazardous and nonhazardous wastes, if you could provide that to us I think that that might flesh out the record.

Finally, Mr. Chairman, are we going to have an opportunity on this issue to—we have been referred to what the Canadian Government is doing and what their policy is. Are we going to have an opportunity to hear from them, either directly or for the record?

The CHAIRMAN. Well, we do not have it planned at this point. I would say that probably the Secretary could speak to that in the few minutes remaining.

Senator WIRTH. I know I used up more than my time. I just have a question as to, I understand that there is some disagreement on what the position of the Canadian Government is, related to the protection of this area and the policy that they have taken related to the protection of the area. Maybe you can clarify that for the record. Can you, Mr. Secretary?

Secretary HODEL. Perhaps providing it for the record would be best because it is fairly complex and there are a fair number of details that need to be included.

Senator WIRTH. In summary, are they for us going ahead as you are recommending or are they against it?

Secretary HODEL. The last official thing I heard from the Canadians is that they would prefer that we not go ahead.

Senator WIRTH. I see.

Secretary HODEL. We have had some disagreement over what the motivation for that might be, in view of their activities on their side of the border and in view of the discusssions we have had here earlier about their aspirations for transportation and so on.

But you know——

Senator WIRTH. So you are suggesting their motives may be other than ones of conservation and preservation of wildlife?

Secretary HODEL. I would not want to speculate on the Canadians' motives.

Senator WIRTH. You were suggesting that in your answer to the question about the earlier question. I just wanted you to be able to expand on what you were suggesting earlier.

Secretary HODEL. Senator——

Senator WIRTH. I always want to give you—any allegations that are made, I always want to give you the opportunity to flesh them out, Mr. Secretary.

Secretary HODEL. What I am indicating is that I have previously speculated on this topic, and that is probably enough for one lifetime.

Senator WIRTH. Well, thank you. I would speculate that probably we are going to have a lot more discussion on ANWR in the future and I will look forward to working with you. I thank you very much for being here and for your patience in the face of a lot of questioning. I look forward to getting your answers.

And Mr. Chairman, I greatly appreciate your time and attention. Thank you, sir.

The CHAIRMAN. Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman.

If I might, I would just clarify a point for my colleague from Colorado. The Prudhoe Bay area is not Federal; it is under state jurisdiction. You should have an ideal opportunity to question state witnesses during their opportunity to testify on your issue of air quality and water quality and hazardous wastes.

And I think you will be satisfied to learn that there has been extensive monitoring.

Senator WIRTH. If the Senator will yield, I was only asking the question as that related to the Secretary's statement that Prudhoe Bay was a model, and if it was a model, you know, what has been collected to make it a model. And I would like to know that, and I hope that it has been.

I appreciate the Senator yielding.

Senator MURKOWSKI. I would hope that you would take advantage of the opportunity this fall and August to join the Energy Committee on a trip up there.

Senator WIRTH. I hope to be able to do so.

Senator MURKOWSKI. It will be very, very enlightening. It will give you a better understanding and appreciation of the job that has been done and the compatibility that has been developed, particularly with emphasis on the environment, the ecology.

And it is something in Alaska that we are very proud of, and we look forward to sharing that with all comers who would make the time and take the opportunity to see the development and what this means, not only for the national energy security of our country, but our State as well.

I might add, rather than ask, which is the privilege of any Senator, that it appears to me that we have kind of a double standard with regard to our friends from Canada. And I am not bashing Canada by any means, but they simply proceed in their own area as they see fit and seem to be motivated by what is in their best interest, whether it be selling gas to us—and I think it is fair to say that the gas that is being consumed, a good portion, at city gate comes in from Canada, and that gas at one time was anticipated to come from Alaska in the Alaska ANGST transmission line.

But as Senator Bumpers has already indicated in his questioning, the economics of that project in relationship to the cost of the project, some $30 to $40 billion, simply made it not feasible to bring in the Alaska gas. As a consequence, the Canadians are providing that gas at much less than we can bring it in from Alaska and will probably continue to do that as they determine their own best interest.

But is it not true that as the Canadians proceed with their activities, they do not ask the Secretary of the Interior for his opinion, or certainly the Congress of the United States?

Secretary HODEL. I think it is fair to say that is correct.

Senator MURKOWSKI. And yet we have a mutual interest, and I think collectively together we could probably do a better job addressing the problems associated with exploration, and we should. And I think as a consequence of some of the more recent disputes, we have a feeling of perhaps more compatibility.

And I have met with Canadian Government officials and found them to be most responsive to that concern that we work together, and I think much of the criticism bringing us at odds is posed by the extreme environmental community that are using this simply as a smokescreen, and when you penetrate beyond that you find that there are reasonable people on both sides that are anxious to get to the facts.

Secretary HODEL. My experience with the Canadians generally, Senator, has been over a long period of time, beginning in 1969 when I went to the Bonneville Power Administration. They are very reasonable, and they are responsible.

They share many common interests with us. They are tough negotiators for the things they care about, but very responsible people generally to deal with.

Of course, my parents both came from Canada to the United States. I have lots of relatives up there, and I grew up recognizing what a unique and special relationship Canada and the United States have had, with such a long unguarded boundary. I have viewed them as America's best friends.

Senator MURKOWSKI. This may be answered by either one of you, but obviously my sensitivities to the arguments that are being posed today against opening up the million and a half of the 18 million acres of the Arctic Coastal Plain are very much the same arguments that were used against the authorization for the Trans-Alaska Pipeline, which obviously made Prudhoe Bay a feasible field, because had the discovery been made and no pipeline authorized by Congress—and we will all recall that that did not go through the Committee structure.

It went right to the Senate, and the Vice President voted the tie by one vote to authorize that pipeline. And today that is producing 20 percent of the crude oil produced in the United States.

And at that time we were arguing the merits of alternative fuels, the economics of coal gasification, synthetic fuels, tar sands, and appropriately so and we are still arguing that.

But is it not true that currently the value of imported oil into this country is about $25 billion per year and thereabouts? And without the Prudhoe Bay oil, which constitutes about two million barrels a day currently, we would be adding another $12 billion to our trade imbalance, that we would have to purchase that amount of oil from outside sources?

Secretary HODEL. Those are the right magnitude of numbers generally, Senator. I cannot attest to the specifics. But at $20 a barrel, you come pretty close to those numbers.

Senator MURKOWSKI. I would appreciate if you would submit for the record your analysis of currently what the Prudhoe Bay production constitutes and where we would be without it.

And I certainly agree with my colleague from Colorado on the necessity of pursuing alternative sources, because it certainly does make sense. But in the meantime, we have the reality of where would we have been today without Prudhoe Bay.

And again, the arguments then were, what happens when you put a pipeline across the migratory routes of the caribou? And I think the Bergerud report which I have given my colleagues this morning will address the reality that the studies made indicate that most of the caribou do not use the crossings, they simply pass over it or under it at their own discretion; and the pipeline itself has proven to be an area where they feed in the spring, because there is a little heat emanating and the grass grows first there. And really, the compatibility of the pipeline and the road have not been detrimental to the caribou in the area of Prudhoe Bay, as proven by the tremendous increase in that herd.

I am interested to pursue one other line of questioning, and it has been touched on by some of our colleagues here, and that is the issue of the land exchanges and the merits and the interests of obtaining valuable wilderness, wildlife lands.

And let us use one example that has been touted by the Kodiak Regional Corporation, which has in their holdings a magnificent bear refuge, where the largest carnivorous animals on earth, the Kodiak brown bear, habitat. And they have received a significant area in their land settlement, and they are proposing to trade this for a position in ANWR on a dollar-for-dollar value, is my understanding. I believe the estimated area that they have proposed is about 250,000 acres.

For the sake of the record, how would you propose, if indeed Congress were to approve of the concept, how would you propose a dollar for dollar exchange?

Mr. HORN. Senator, we have been developing discussions about this concept. As the Secretary indicated earlier, we might be in a position, probably not until early next calendar year, to make some type of a proposal to Congress.

We have been trying to determine an appropriate mechanism for valuing the lands that we would hope to add to the wildlife refuge system. We have put together a comprehensive system that looks at fair market value and some of the transactional benefits.

Senator MURKOWSKI. Well now, there is not much bear refuge sold.

Mr. HORN. We are looking at——

Senator MURKOWSKI. You are looking at leases in ANWR that you do not know what the geology is?

Mr. HORN. Let me explain the value processes on both sides. It is obviously going to be subject to intense scrutiny.

On the refuge acquisition side, we are looking at fair market value, relative public interests, and Congressional precedents, because Congress since 1971 has expressly approved a whole number of land arrangements with Alaska native corporations, under which specific values were assigned.

I will give you one example. We purchased acreage in the Pribilof Islands pursuant to title 14 of the 1980 Act, and we paid about $630 to $640 an acre for that land, pursuant to a Congressionally specified valuation arrangement. We have had similar Congressionally specified valuation arrangements for other corporation land settlements.

We have been looking at those along with fair market value and along with general wildlife values to try to develop some valuation that fits within the confines of what Congress has previously undertaken. That is on the acquisition side.

On the side under which the limited interests that we might prospectively trade to natives in the 1002 area, we are talking about using the data that generated the information in this report to do the standard valuation process that is employed any place else that we do competitive lease sales.

We have computer models. The geologists look at the information, the economists plug in the variables, and that yields a dollar amount that sets what the Government thinks is the fair market value. That is a floor that it sets for disposing of an interest.

Obviously, the number that would be set in these discussions would not be subject to any form of negotiation. Whatever our process sets as the value will be the value, and if we were to do any type of arrangement the other partners in the exchange would have to accept the value established for the mineral estate.

Senator MURKOWSKI. Well, you are Assistant Secretary for Fish and Wildlife.

Mr. HORN. Yes, sir.

Senator MURKOWSKI. What is your assessment of the national wildlife interest of acquiring that from the standpoint of enhancing the habitat? Why is it so unique? Why is it so significant? Why is it worth considering an exchange?

Mr. HORN. Let me just give you two of the examples. As you cited earlier, Kodiak Island is the home of the Kodiak brown bear, the largest landborne carnivore. Much of the critical habitat, much of the key lowlands along places like Karluk Lake and River, passed into native ownership under the terms of the 1971 Native Claims Settlement Act.

We frankly do not possess in public ownership the really critical bear habitat on Kodiak Island, and the Service would very much like to reacquire that land so that we can continue to manage that land and protect and secure the future of that magnificent wildlife resource.

Similarly, you go out into the Yukon Delta, which is probably one of the largest wetland areas in the world. It produces enormous numbers of migratory waterfowl. In some areas the native corporations own, again pursuant to Act of Congress, some of the premier nesting sites.

One area that has been offered to us has over 50 percent of the total nesting population of the Pacific black brant. We could reacquire 50 percent of all the nesting nabitat in one arrangement and ensure its continued protection for future generations.

Those are the magnitude of the resources that could be added to the public estate as a result of this exchange, which is why from the fish and wildlife perspective we think it is worth at least continuing the discussions so that we may be in a position to present a proposal to Congress some time in the future.

Senator MURKOWSKI. Are they not likely to stay in that state anyway?

Mr. HORN. No. On Kodiak Island, some of this key land along the Karluk River has already been subject to subdivision plats, because obviously these corporations have obligations to their shareholders and need to be in a position to basically make some return. That is the purpose of the Native Claims Settlement Act.

And that of course would, I think, be deleterious to the wildlife interests out there.

Senator MURKOWSKI. There appears to be a difference of opinion between the State of Alaska and the Department of Interior over the "core calving area." Yet, I have had conversations, as you have—and I look forward to the testimony of our Governor and our state officials, which will be Thursday of this week.

I am wondering if you could give your evaluation of what this difference consists of, so you will understand it—excuse me, so I will understand it—I have been on that airplane for 13 hours—so I will understand it completely and we can make sure that we understand each other's particular concerns, both yours and the State, and see if we can reach a resolve.

Mr. HORN. We used the term "core calving area 'in the draft report—which, let me just add, was put out under my name and I am also a political appointee of the Department.

Through the public comment and the consultation with the Government of Canada, we came to the conclusion that the use of the term "core" was a misleading one and was resulting in misconceptions on the public's part. People had the idea that the core calving area was something like the natal stream that a salmon returns to, that there was one piece of acreage——

Senator MURKOWSKI. Well, let us qualify that. That is a good example. Salmon always return to the same stream to spawn.

Mr. HORN. That is correct.

Senator MURKOWSKI. Anadromous fish.

Now, that application of principle does not apply to core calving areas, is that right?

Mr. HORN. That is the primary reason we dropped the use of the term "core" and have used the term "concentrated" because the animals will range and calve throughout——

Senator MURKOWSKI. Why did you confuse things by using "core" the first time?

Mr. HORN. It was thought that at the time it would give some idea of, or a better indication of, the areas that the animals showed some degree of preference for, and hence we picked it.

As I said, when we came out and discussed it with people, the conclusion was that people thought that there was one spot that the caribou always returned to. I can remember in our consultations the Canadian biologist agreed with us that the use of the term "core" was misleading people, and we would be better off and more accurate to use the term "concentrated" because it demonstrates that there are these aggregations of animals in specific spots in different years, and they move around throughout that 8.9 million acres.

Senator MURKOWSKI. What is your area of concentration that you use in your definition?

Mr. HORN. Basically, you have to have one caribou per ten acres during calving period to qualify as a concentrated calving area. And you can see on the map there where the areas of concentration have occurred over time.

I would refer anybody interested to pages 22 and 23 of the report. There are a series of 15 maps reproduced on those two pages, showing you where the calving activity has taken place each year for the last 15 years.

Senator MURKOWSKI. And that is over how broad an area?

Mr. **Horn**. Some years they never make it into the United States and do all their calving in Canada, for example.

Senator **Murkowski**. Is that because of snow or a tough winter?

Mr. **Horn**. The biologists are still trying to figure out what the factors are that make the caribou come to one area on the——

Senator **Murkowski**. Could you give for the record the acreage in your "concentration"?

Mr. **Horn**. The one area in the Upper Jago River that they have shown a fair degree of preference for, basically 7 to 11 years out of the last 15, is approximately 84,000 acres.

Senator **Murkowski**. 84,000 acres.

Mr. **Horn**. The area is in the dark red up here on this map. You can see it referenced in the report itself.

Senator **Murkowski**. Is it not generally understood that there if there is little activity in an area, that it does not deter the caribou from coming on their natural path and walking around the area and doing whatever they are going to do from the standpoint of the break, when the males stay in the heavily foddered area where the feed is good and the females go out where there are no predators to calf?

Mr. **Horn**. Well, based on the experience at Prudhoe and elsewhere—you know, there has been extensive interaction between caribou and human activity throughout the northern hemisphere—the predictions are that the pregnant cows would move away from the site of human activity one to three kilometers, half a mile to approximately three miles, and then engage in their calving activity at the new spot.

And based on the experience at Prudhoe, that displacement of that limited distance has had no mortality consequences that anybody can measure. And the expectation here is that it is more than probable that, if you put a full-bore oil development facility in this Jago River area and some portion of the herd in a given year appears and moves away one to three kilometers, it is more than likely that they will calve successfully with no significantly measured mortality effects. However the biologists are careful to say that there is a risk that that displacement could cause some mortality consequences.

They are unwilling, and I think it is appropriate, to say that the experience that we have had at Prudhoe Bay, where displacement has not caused mortality, will be repeated absolutely the same in this particular area.

But it is probable that it will be.

Senator **Wirth**. Would the Senator yield?

Senator **Murkowski**. Yes.

Senator **Wirth**. I was just looking at the maps on pages 22 and 23, the part of the discussion you were having with Senator Murkowski, and there is no source for where these maps came from. Are these Fish and Wildlife maps or Department of Natural Resources in Alaska, or who prepared the maps?

Mr. **Horn**. Fish and Wildlife Service prepared these maps for insertion in the report. The data have been gathered from a group of sources—State fish and game, Canadian Wildlife Service, some of our own work, and some other independent academics who have been studying the area.

This basically represents the amalgamated information of the caribou professionals who have been gathering information.

Senator **Wirth**. The amalgamation was put together by the U.S. Fish and Wildlife Service?

Mr. **Horn**. Yes, sir.

Senator **Wirth**. Thank you.

Senator **Murkowski**. Could you capsulize where you see the difference between your recommendation and the state's position?

Mr. **Horn**. I think the simple difference concerns this one 85,000-acre area that the animals have shown some degree of preference for. The position that the Secretary has recommended I think is an appropriate one, to ask Congress for authority to establish an orderly leasing program.

The question of whether that place gets leased first or last can be addressed in the context of more site-specific environmental analyses and development work.

Senator **Murkowski**. Well let me ask you this. Let us assume that Congress were sympathetic and gave you the authority to go ahead with the proposed lease, and then the State came back to you and said, no, we really have a concern about this area, not a concentrated core calving area, but this area, and we would like some consideration given.

What would be your attitude towards the sensitivities of the State? Or let me ask that question and let me follow up by saying, is there any justification to propose to lease the most sensitive areas first, under the assumption that you might not find the oil and you would not have a problem, because you usually do not find oil when you look for it.

Secretary **Hodel**. Senator, if I may liken this to the OCS process, once the five-year plan is in place, then each lease sale under that five-year plan has its own independent analytical review process, during which there is a very substantial time for State involvement and input from various organizations and groups.

This has a distinct effect upon the decision made by the Secretary, regardless of party, on what he proposes to lease. I would anticipate the same kind of thing happening here. In any kind of orderly lease process we would receive comments, indications of interest, and indications of concern.

In looking at the map, you would see that one of the scenarios shows a possibility of drilling in the area near one of the rivers. If it happens to be determined by the wildlife people that the area is particularly sensitive for the musk-oxen because they tend to occupy the river valleys in this area, then it very well could be that the decision would be that the area—that tract, or that portion of the tract which was down in the river valley—would not be put up for lease.

And the answer to the explorer will be: You will have to try to reach that area by slant drilling or directional drilling and the like.

In other words in my view, under any ordinary lease program, there is a very substantial opportunity for a case-by-case discussion and analysis of each potential exclusion or inclusion.

Senator MURKOWSKI. What assurance would the State have if Congress gave you the authority that you would be sympathetic to the expressed sensitivities of the State?

Secretary HODEL. If the Secretary of the Interior has the responsibility, the assurance that the State would have is that it has the opportunity to participate, to express itself, to be heard.

I think we have a track record that indicates—not that we are always able to resolve every difference—but that the State of Alaska and the Department of the Interior have substantially been able to work out differences. Very sizable exclusions have been made from the OCS program at the request of the State—deferrals of sales, deferrals of entire areas—at the urging of the State.

So while we have not always been able to accommodate 100 percent of their recommendations, I think we have a record that is pretty positive in that regard.

Senator MURKOWSKI. I wonder if you would comment for the record and explain the aspects associated with the proven oil reserves, including the West Sac part, the heavy sand oil that is included in the reserves, but that has never been economical to develop simply because the advanced technology is not there yet.

So when you look at reserves of the magnitude that have been expressed in the record, you have to address the reality that the economics do not justify production. Perhaps either one of you could comment.

Senator BINGAMAN. I am particularly interested in the area that overlies Prudhoe Bay. The reserves are there. It is heavy oil, but the recoverability question, how you have to keep that in balance.

Secretary HODEL. Senator, it seems to me that it would be appropriate for us, in responding to Senator Wirth's questions earlier, to get into the matter of oil quality, which bears upon the economics and the transportability and the like.

I do not think we are able to do that in any detail now, but your point is well taken. There may be large numbers in reserve, but if they are not convertible to oil which can flow through a pipeline at anything approaching the current prices then, while they count as reserves, they will not count as currently recoverable reserves.

We will try to distinguish in that answer for the record between reserves and currently usable to the extent we can. I do not want to promise more than we can deliver on this, but to some extent indicate what we think it would take to convert some of the currently unusable to usable reserves.

Senator WIRTH. If we cannot, maybe we ought to be doing a little research to figure out how to do that.

Secretary HODEL. A fair amount of research is going on on that subject. However, nobody has found the magic.

Senator MURKOWSKI. I would request for the record that we get an assessment from Interior and/or Energy of the recoverability of the reserves, and I think it would be noteworthy.

And obviously the incentive is there in the industry so they can generate a return. But so far that has not been the point.

Now, what has been the field that has been closed?

Mr. HORN. Milney Point.

Senator MURKOWSKI. And that was closed as a consequence of the economics?

Mr. HORN. That is my understanding.

Senator MURKOWSKI. That is my understanding, too. So we have had evidence where they have gone out and drilled a field, put in substantial costs, and because of the decline in oil not been able to continue to keep it in production and shut it down.

Yes or no or maybe?

Mr. HORN. Yes.

Senator MURKOWSKI. Thank you. That is a yes?

Mr. HORN. Yes.

Senator MURKOWSKI. I think this is about my last question. I know some of you will be relieved, not all of you.

The question of whether we are opening ANWR or whether ANWR has never been closed, and we go back to the authorization which ANILCA established, which said in effect that we are putting off this area, we are putting this area aside, we are putting it under Congressional study, it will take Congressional action.

But in reality, has it ever been closed?

Mr. HORN. It is closed now by virtue of title 10. All of the Department's administrative authorities to permit oil and gas activity have been superseded by this special arrangement in title 10. Our hands are tied and the whole issue is before Congress.

So it is in your court, not ours; and it is going to take some action one way or the other on behalf of Congress to decide what to do with the future.

Senator MURKOWSKI. Well, let me put it another way, which we can always do when we want to get the right answer. Congress never closed it; they just put it off for later disposition, and that is where we are today. Is that a fair statement?

Mr. HORN. That is correct.

Senator MURKOWSKI. They said in effect, do not do anything until you have studied it, made recommendations, and Congress has decided what the disposition should be.

Do you recall how much was expended on the Mukluk Hole, which was a sure thing and all the oil companies were standing in line to throw their money into it?

Secretary HODEL. Well, in excess of one billion dollars was the figure that I have seen.

Senator MURKOWSKI. And as far as we know, no recoverability?

Secretary HODEL. No recovery.

Senator MURKOWSKI. What is the estimate of what you might lease this for?

I have got a figure here in your report.

Secretary HODEL. We would be happy to have you supply that for the record, Senator.

Senator MURKOWSKI. It says something about $79.4 billion of undiscounted 1984 dollars under full leasing.

Mr. HORN. I think those are sort of net economic benefits, as opposed to the numbers in dollars we would expect to generate from a lease sale.

Are you on page 186, sir?

Senator MURKOWSKI. I am on page 181.

Mr. HORN. 181.

Senator MURKOWSKI. Right-hand column, lower right-hand paragraph. $79.4 billion.

Mr. **Horn**. That is the net national economic benefit that is expected to be generated. That is not only the Federal dollars, the State tax dollars, but also the jobs created and all the multiplier effects. We estimate those numbers to be from $79 billion all the way up to $325 billion.

Secretary **Hodel**. Senator, I might comment on the manner in which those estimates are made. As a layman, not an economist, it is almost mystical. But it is necessary to have numbers.

Those numbers are particularly based on the mean estimate, 3.2 billion barrels of recoverable oil in place. There could be much less, there could be much, much more than that in the area.

What is then done is, after a lot of guesstimates are put into the computer, the computer model operates and comes out with this array of probabilities. Based on that, you get to 3.2 billion, you then multiply by estimated future prices of oil, discounted to the present, and you end up with some such number.

It is better than no number at all.

Senator **Murkowski**. Okay, so you do not have any idea?

Secretary **Hodel**. A whole lot, and that is only an estimate.

Senator **Murkowski**. Senator Bumpers brought up an interesting point, and I think you can observe that he is genuinely concerned about the philosophy of what was done at Kuparuk with the exchange. And I think it is important to point out for the record that as a consequence of that exchange that Kuparuk became, not Government, but fee simple——

Mr. **Horn**. Kaktovik?

Senator **Murkowski**. Kaktovik, I'm sorry, Kaktovik not Kuparuk.

It was passed from Federal estate to private estate when it moved under the authority of the Arctic Slope Regional Corporation at Kaktovik. Now, at that point the well—the agreement was made, the well was drilled, and the information is held by some.

If you had the information and it was known, what would it do to the salability? Of course, the answer is it would depend on the information. So does it really make any difference?

Secretary **Hodel**. Not only that, Senator. Let us suppose that it indicated that that was right on top of or into a stratographic trap or into a structure. That does not necessarily mean that any other structure in the field contains oil.

I would expect, however, that an actual find would excite great interest. On the other hand, in terms of the bids, not knowing what that well has found might have more upward pressure on the bids than if people actually knew what it found.

Senator **Murkowski**. Well, let us use Mukluk as an example. A billion dollars for the well, and I do not know what was expended by Chevron and Arctic Slope for this well. Could we have that figure for the record?

Secretary **Hodel**. It would be substantially less. It would still be a very high amount of money, but substantially less because it is an onshore activity.

Senator **Murkowski**. So if it was a dry hole and that was made known, what would it do to your bids?

Secretary Hodel. It would have some downward effect on the bids, just as the Mukluk well has had, I would say, a very substantial downward effect on any interest in the vicinity of Mukluk.

Senator Murkowski. It sure has.

Secretary Hodel. And just as the other dry holes offshore Alaska have had a similar effect. And once that has happened, there is just a dramatic dropoff in interest.

Senator Murkowski. I would like to clarify for the record your assessment of an observation that was expressed by the Senator from Arkansas, Senator Bumpers, with regard to the gas announcement concerning Yukon Pacific. That was a joint study with the Japanese, I believe, is that not correct?

Secretary Hodel. I am trying to recall. After one of the summit meetings, this country undertook with Japan a study of the oil or the gas potential and other energy interests. And I am not personally familiar—I have only been advised, in fact, as I was coming to this hearing about the discussion yesterday of doing a study to determine whether the necessary findings could be made by the President with regard to that.

Senator Murkowski. What I am getting at is that it is hardly a reality in the sense of being anything more than an acknowledged evaluation that there is a potential proposal. But it would require an export permit, it would require a presidential finding of fact, and many, many other things.

Secretary Hodel. That is my understanding.

Senator Murkowski. And I assume as well, is there not a precommitment for that gas in another scenario that may have some application? Is not the old ANGST going to use that same gas to market it in a different market? Was that not——

Secretary Hodel. Senator, that sounds right, but I could not answer accurately for the record. At this point I would have to supply that for the record.

Senator Murkowski. I would appreciate for the record you supplying a refreshing review of where that project is from the standpoint of the Department of the Interior.

The only other thing I would like to enter into the record, Mr. Chairman, is some figures that may or may not be correct. But with that, I would qualify them that since 1981 the Congress has appropriated approximately $400 to $450 million every year, in parenthesis, "despite the Administration's budget request," end of parenthesis.

These funds go to R&D, transportation, industrial conservation, building conservation, weatherization type programs. And in addition, the Administration has supported the Exxon and stripper well settlements, giving over $2.5 billion to states for conservation purposes.

And I would request my staff make sure that those figures are correct.

Senator Wirth. Without objection, why do we not just make sure that the staff conforms that with the issue brief from which I was quoting done by CRS recently, Issue Brief No. IB-75020, which focuses on all these issues, conserving energy resources.

Senator Murkowski. Mr. Chairman, I thank you.

And I very much appreciate, Mr. Secretary and Mr. Horn, your bearing under this grueling evaluation of a project that I think is probably one of the most significant single energy issues before this Congress. And the applications of the decisions to be made by this Congress are certainly going to be far-reaching as we evaluate whether or not to inventory, authorize the inventory of this area that appears to be so promising.

And I think that you have both done a commendable job in answering a broad range of questions. And I think in my observation the oversight that is going to take place in the next three hearings, why, the other witnesses can be prepared for a broad range of subject matters.

Thank you, Mr. Chairman.

Senator WIRTH. Thank you very much, Senator Murkowski. I would only add that this is one of the single most important issues.

I think we just ought to supplement the word "energy" which you had used and add "conservation and wildlife," as I think that has very significant implications there as well.

Senator MURKOWSKI. I would agree.

Senator WIRTH. Under Secretary Horn, before we leave I wanted to thank you for your help on a different issue of also extraordinary national importance, the Long Lock Dams and the National Park Service. You were very helpful in sorting through a very thorny problem, and we thank you very much.

Secretary Hodel, I know that our gratitude for your being here this morning is matched only by your gratitude that the hearing is now over.

And the next hearing on this issue will be Thursday morning at 9:30, when we will hear from the State of Alaska and several Alaska Native witnesses.

Gentlemen, thank you very much for being here. We look forward to hearing from you on the record and elsewhere and working with you. Thank you.

And the Subcommittee will recess.

[Whereupon, at 12:50 p.m., the hearing was recessed to reconvene Thursday, June 4, 1987.]

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

THURSDAY, JUNE 4, 1987

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 9:30 a.m., in room SD-366, Dirksen Senate Office Building, Hon. J. Bennett Johnston, chairman, presiding.

OPENING STATEMENT OF HON. J. BENNETT JOHNSTON, A U.S. SENATOR FROM THE STATE OF LOUISIANA

The CHAIRMAN. The hearing will come to order.

The hearing this morning is the second of four oversight hearings the Committee has scheduled on the Secretary's report to the Congress regarding oil and gas leasing on the Coastal Plain of the Arctic National Wildlife Refuge in Alaska.

Today we are going to hear testimony from the Governor of Alaska and several Alaskan Native witnesses. We will conclude this first round of hearings next Thursday and Friday when the views of several conservation groups and oil industry representatives will be heard.

The hearing record will remain open for two weeks to receive additional views and materials regarding the Secretary's report.

And now it is my pleasure to recognize our esteemed colleague, Senator Murkowski, who in turn will introduce the Governor of Alaska.

STATEMENT OF HON. FRANK H. MURKOWSKI, A U.S. SENATOR FROM THE STATE OF ALASKA

Senator MURKOWSKI. Thank you very much, Mr. Chariman, and let me thank you for holding this hearing which provides Alaskans with an opportunity to testify on this very important and vital issue. I am going to go ahead and introduce our Governor, Governor Cowper. You may, with the acknowledgement of the Chairman, approach the witness table. Is that appropriate, Mr. Chairman?

The CHAIRMAN. Yes, he certainly may.

Senator MURKOWSKI. All right. Governor, I will make a few remarks in introducing the Governor, who was elected last November to a four-year term, former district attorney and private lawyer from Fairbanks, and a resident of the Chena Pump Area, which we share together, kind of a long distance residence, but nevertheless when we get a few moments we do spend our time there.

The Governor served in the legislature during the 1970's and has just survived his first Alaska legislative session, and it has been made more difficult by a 50 percent reduction in State revenues, so he bears the scars of the alternatives, which are either to increase revenues or reduce services, and we are faced with those same realities. We certainly look forward to your testimony, Governor.

I also want to welcome the other Alaskans who are here today, particularly the witnesses, Mayor George Ahmaogak of the North Slope Borough, Oliver Leavitt, the Arctic Slope Regional Corporation, Archie Brower, of the Kaktovik-Inupiat Corporation, Kaktovik. We have other witnesses here as well from Venetie, Mr. John Titus from Arctic Village, Mr. Lincoln Tritt, Arctic Village, and Sarah James.

The testimony from this group, I think, will be very enlightening, Mr. Chairman, to our record. I think it wil be an interesting contrast to the hearing that we had on Tuesday. The testimony and quesitons on Tuesday really covered the waterfront. I think we discussed everything from the ozone sunglasses to the Persian Gulf. The testimony today will be quite different.

We will hear from the people most directly affected by this Committee's decisions and actions on ANWR. We will also hear, of course, from our Governor, who has the obligation of balancing the critical needs for economic development and diversification with the need to ensure the integrity of Alaska's special environment and one that we treasure.

I also look forward to hearing the State's position as enunciated by the Governor on the handling of the alleged calving area for the Porcupine caribou hero. As you will recall, Secretary Hodel noted a difference of opinion between the Department of the Interior and the State on the issue. We would hope that the Governor would put that difference of opinion in perspective and fully explain the State's proposal to give Congress the opportunity to revisit the issue at a later time if indeed that is the intention of the State.

We will also hear from chosen representatives of the people who live on the North Slope of Alaska, and these are the people who really must strike a balance, a balance between their desires to maintain a traditional subsistence way of life and the necessity to participate in the commercial economic society which offers year-round employment.

I would urge the members of the Committee to pay very close attention to the testimony of these witnesses. The decision to permit oil and gas exploration and development on the coastal plain of ANWR is very much a national energy issue, yet it is also an issue which will have substantial local impact on the people of the North Slope and the rest of Alaska.

Mr. Chairman, thank you for the opportunity to make this statement and introduce our Governor, the Honorable Governor Cowper, the State of Alaska.

The CHAIRMAN. Thank you very much, Senator Murkowski.

Welcome, Governor Cowper. Please proceed.

STATEMENT OF HON. STEVE COWPER, GOVERNOR, STATE OF ALASKA

Governor COWPER. Thank you, Mr. Chairman.

As Senator Murkowski pointed out, I am Governor Steve Cowper of the State of Alaska, and I appreciate the opportunity to place before this Committee the views of my administration with respect to this very important legislation that so affects our future as well as the future of the United States.

With the permission of the Committee and of the Chair, I would like to submit my written comments and to have permission to summarize my comments. I am a little more informal than some——

The CHAIRMAN. We would prefer that, Governor.

Governor COWPER. I thought you might, Mr. Chairman.

Mr. Chairman, I believe that this question essentially resolves itself into two areas. I believe that the first question is whether or not there should be a development of the refuge, the coastal plane of the refuge, I hasten to add, and the second question is whether it can be done safely from the standpoint of environmental constraints and from the standpoint of protecting the wildlife which have to be considered since what we are doing here today is considering opening a national wildlife refuge for oil and gas development and production.

The State of Alaska strongly supports Federal legislation to open the Arctic National Wildlife Refuge Coastal Plain to the production and development of oil and gas. We believe that it is in the best interest of the nation and we believe that it can be done and that it will be done in a way that properly takes into consideration other values which must be considered.

I would like to elaborate a bit on our position. The first thing I would like to comment on is the prospects of making a find of substantial proportions in the coastal plane of the refuge. First off, in order to state to this Committee, I am sure it is redundant, but the refuge itself is very large, some 18 million acres, I believe, and a very small part of the refuge has been reserved from wilderness status. Most of the refuge is in wilderness status. The coastal plain was not designated in that way in the Alaska National Interest Lands bill in 1980.

The reason for that was that it was thought at that time that there were substantial prospects for oil and gas development and that it could probably be done in a way that would not conflict substantially with the wildlife values that were reflected in the designation of the refuge to begin with.

The prospects on the coastal plane for the finding of oil and gas and substantial quantities are frankly enormous. We believe that all the geological prospects are there. Those elements that are looked at by the industry with favor are present in the coastal plain, and many people believe who know what they are talking about, many people believe that this is the best prospect for substantial oil and gas finds in North America.

We concur with that view. The Interior report indicates that there is a 20 percent probability of a find in the coastal plain.

A lot of people ask immediately why would anybody go in there when there is only a 20 percent chance of finding oil and gas in commercial quantities. I think it is in order to say that a 20 percent chance in terms of the oil and gas industry is very, very high. The oil and gas industry commonly explores areas that have much, much less in terms of a prospect. The 20 percent indicates that this is indeed one of the most promising areas for oil and gas exploration and development in the world, not to speak of North America.

We have on the North Slope of Alaska already a major transportation system which has been constructed in terms of the Trans-Alaska pipeline system which would be available and ready for the transportation of any oil that might be produced from the coastal plain area. I would like to comment also briefly on the effect of production of this oil if indeed we do find oil in commercial quantities on the coastal plain. I would like to talk about the effect in terms of the U.S. energy picture.

One-half of the projected production of Prudhoe Bay—the total production is expected to be around 10 billion barrels—one-half has been produced today. Beginning very soon the production in the Prudhoe Bay field will begin to decline. In the year 2000 we expect, for instance, to be producing about 385 million barrels a year. Today that production stands at nearly twice that, at 686 million barrels per year.

In terms of the national energy picture, by the year 2000 we expect to be producing somewhere between 4.5 and 6.5 million barrels per year, which by the way, will be at that only somewhere between 24 and 37 percent of domestic consumption, which is another way of saying that if we do not have major finds and if we do not begin to produce fields such as the Arctic National Wildlife Refuge Coastal Plain, we will be importing somewhere between 63 and 76 percent of total domestic consumption in the United States of America.

The Coastal Plain could do a whole lot for that picture. If we are able to produce somewhere between 800 million and 1.5 billion barrels of oil per year, which is at least within the range of reasonable possibility, then that could add from 18 to 33 percent to the presently projected rate of domestic production in this country.

That oil would, of couse, replace oil that would otherwise have to be imported from other countries, and it would have a profound effect on our current balance of payments problems, the trade deficit. We think that it is important to consider that particular aspect of this production. It would also, of course, lead to substantial economic activity. I do, in fact, have a parochial interest in this, as you might imagine, but a recent study of Prudhoe Bay development and productive showed that in fact every State in the Union benefitted from the economic activity that has taken place on Prudhoe Bay in the last 10 to 12 years. Every single State benefits economically, some more than others, but many States benefitted in a very substantial way. Jobs will be created at a time when in Alaska, in my State, the economy is in much difficulty.

I would like now to address the question of whether this exploration and development and production can be done with reasonable safety with respect to the environmental questions which will be raised and also, of course, with respect to the wildlife values that have to be considered. I would like to preface my comments by pointing out that the State of Alaska has managed major oil development and major oil exploration in the Arctic Coastal Plain for almost 20 years. We have only been a State less than 30 years, so for about two-thirds of our existence we have been in the business of managing oil development on the Arctic Slope. We feel that we are experience in that area and that we are competent in terms of our ability to manage properly that exploration and development.

I might point out that there were a lot of questions about the effect of the development at Prudhoe Bay on the central Arctic Caribou herd. That herd has increased since Prudhoe Bay was developed by a factor of three. It is three times larger than it was before the Prudhoe Bay area was developed. Now, that does not mean to me that oil development is good for caribou. I do not want to say that. But it does indicate that the caribou are probably not as concerned about the presence of oil production facilities as some people are.

I hasten to add to that comment, however, that the herd with which we are concerned in this legislation is not the central arctic herd, it is a herd called the Porcupine herd, and that does not mean that they have quills. It means that they originate in an area in the Yukon Territory around the Porcupine River, and because of that they are designated as the Porcupine herd. That herd has some 180,000 animals. It migrates every year from the Yukon Territory into the State of Alaska during the summer and its calving area happens to be right in the Arctic Coastal Plain area.

We think that that creates a situation that calls for special consideration of the core calving area. The scientists who have been able to evaluate the area in which the Porcupine herd area calves have noted that while the females tend to move around from year to year there is an area which can be designated with reasonable certainty, a so-called core calving area. That area was designated in the original draft report which the Department of Interior submitted earlier this year. In the final report it had disappeared for some reason. But we agree with the conclusion that Interior originally reached in its draft report.

We think there is a core calving area, and we believe that it has to be treated in a different way than the rest of the Coastal Plain, so what we have suggested is that the Congress authorize the State Department of Fish and Game and the Fish and Wildlife Service to undertake joint studies of the so-called core calving areas and that the information that is received over that seven-year period be then submitted to the Department of the Interior and to the Congress and that based on those studies the Secretary have the authority to open up the area or to close the area to future oil and gas exploration and development based on the conclusions in that report, and that the Congress have an additional three years in order to disprove the Secretary's conclusions.

Now, several questions have been asked about where the core calving areas are. We have an interesting situation in that a lot of data was collection from 1972 until 1978, and the date itself was destroyed in a fire. There are a number of wildlife biologists who agree that there is a central place where the caribou commonly congregate for the purposes of calving, but they tend to disagree with each other, and we would like the indulgence of this Committee to try to sort out that sometimes conflicting data and to submit to the Committee in a legible and understandable form what we believe to be the core calving area which we think needs to be taken out of eligibility for leasing for a 7 to 10 year period.

Summing up, Mr. Chairman, we believe that this question does not involve a struggle between the forces of light and the forces of darkness. We believe that this is a question for which there are rational answers which can be reached through careful analysis of all the questions that this Committee will be taking up. Briefly, our position in the State of Alaska is that the probable benefits of the exploration and development of the coastal plain to the nation would outweigh the probable risks to the nation of that exploration and development.

That concludes my formal testimony, Mr. Chairman, and I am happy to respond to whatever questions the Committee may have.

[The prepared statement of Governor Cowper follows:]

STATEMENT OF GOVERNOR STEVE COWPER
ON THE ARCTIC NATIONAL WILDLIFE REFUGE
SENATE ENERGY COMMITTEE
June 4, 1987

Mr. Chairman and Members of the Committee:

I am Governor Steve Cowper of Alaska. I very much appreciate this opportunity to present the views of my Administration on federal management of the coastal plain of the Arctic National Wildlife Refuge (ANWR).

Six weeks ago, the Secretary of the Interior, as required by the Alaska National Interest Lands Conservation Act, submitted his report regarding the future of the Arctic coastal plain. The Secretary recommended that Congress authorize oil and gas leasing in ANWR. As the 100th Congress considers this issue, the State of Alaska intends to be an active participant.

My Administration strongly supports federal legislation to open ANWR to development and production of oil and gas. During the upcoming deliberations, Congress will focus on the central issue of whether to provide access to this area's petroleum potential and its attendant benefits to national economy and national security. The State of Alaska, by virtue of its 20 years of managing oil and gas development in the Arctic, is well placed to assist you in accomplishing your task.

HYDROCARBON POTENTIAL

The coastal plain of ANWR is the most prospective unexplored petroleum province left in North America. It has been clearly demonstrated by federal, state and independent investigators that the coastal plain (or 1002) area could yield Prudhoe Bay-size quantities of petroleum. As you know, the Prudhoe Bay field on Alaska's North Slope is the largest oil field in North America, with original reserves of nearly 10 billion barrels of recoverable oil. Prudhoe Bay today accounts for more than 20 percent of the U.S. domestic crude production.

All of the key geologic elements necessary for major hydrocarbon accumulations exist beneath the 1002 area. Oil seeps, oil-stained reservoir rocks and excellent quality petroleum source rocks are present. Large subsurface structures and traps have been mapped from seismic data. The federal 1002 report documents 26 of these large, prospective structures beneath the surface of the coastal plain. In addition, the 1002 area lies between the huge discoveries at the Prudhoe and Kuparuk oil fields to the west, and the Canadian Mackenzie Delta field to the east.

How much oil ANWR holds is not known and, in fact, cannot be known until exploratory drilling is undertaken to confirm or refute our expectations. It is estimated, however, that if oil is found beneath the coastal plain, there is a five percent probability of finding between 26.5 and 29.4 billion barrels of oil. This compares favorably with the 23.5 billion barrels initially in-place at Prudhoe Bay. For perspective, it is note worthy that prior to drilling, some industry officials estimated that there was only a 2 percent probability that the Prudhoe area contained as much as 2 billion barrels of oil.

Exploring for oil and gas in frontier areas such as the coastal plain of ANWR is an extremely risky enterprise. The worldwide success ratio for exploratory wells in frontier areas is about one in 20, or 5 percent. In ANWR, the odds are estimated to be much better. The federal government estimates there is a 20 percent chance that economically recoverable oil is present in the 1002 area. The relatively high probability of finding significant quantities of oil in a relatively small area of the coastal plain is highly attractive to the petroleum industry, which routinely explores for oil in far less promising areas.

In our opinion, development of ANWR'S petroleum potential is in the national interest. We have just recently produced the five billionth barrel of Prudhoe Bay oil. This means that one-half the total proven 10 billion barrels of recoverable oil have been produced and that the largest field in North America, which accounts for more than 20 percent of domestic production, will begin a precipitous production decline in the near future. By the year 2000, Alaska's yearly production will have dropped to approximately 386 million barrels per year from today's rate of 685 million barrels per year.

Production from the ANWR coastal plain could help to significantly offset the expected decline. Industry experts place the range of potential U.S. domestic production by the year 2000 at between 4.5 million and 6.4 million barrels per day, substantially less than the current 8.3 million barrels per day. These quantities would satisfy between 24 percent and 37 percent of projected domestic consumption.

ANWR could contribute an additional 800,000 to 1.5 million barrels per day over the previously mentioned lower production estimate. This represents an increase of from 18 percent to 33 percent over the lower production estimates. Such increased production would replace imported oil, thereby contributing positively to our balance of payments and national energy security.

In addition to the benefits I have already mentioned, the Department of the Interior estimates that a discovery of between 3.2 and 9.2 billion barrels of recoverable reserves would generate billions of dollars in economic activity. These results would accrue to virtually every state in the country. The experience of Alaska North Slope oil development and production from 1980 to 1986 illustrates the potential benefit of ANWR development to the national economy.

During this period, more than $17 billion were spent on North Slope development. One study, which examined the expenditure of $10.5 billion of this total, concluded that over $50 million were spent in each of 22 states. In three of these states, more than $1 billion were spent, and in 10 states, expenditures exceeded $100 million.

Another nine states benefited from between $9 million and $50 million of North Slope related business. The remaining 19 states gained to a lesser degree; however, every state experienced some economic activity as a result of North Slope development.

In summary, we believe that the high prospectivity and the potential to supplement the projected domestic production decline justifies an early and expeditious assessment by exploratory drilling of the petroleum resources beneath the coastal plain. The chance to improve national energy security and the overall balance of trade through increased domestic production, as well as the nationwide economic benefits, argues convincingly for opening the refuge to early exploration and development.

CARIBOU AND OTHER WILDLIFE AND FISH

In addition to its hydrocarbon potential, ANWR possesses other natural resources of national, and in some cases international, significance. Wildlife resources include caribou of the Central Arctic and Porcupine herds, muskoxen, and snow geese and other waterfowl. Fish resources include migratory Arctic char and whitefish.

These fish and wildlife resources are an important component of the economy and culture of local communities in Alaska and Canada. The State has a great interest in seeing that development is done properly with respect to such resources, since we must live with the results. We believe that the impacts on fish and wildlife resources can and should be minimized during the production of oil and gas in the area.

Perhaps the environmental issue which has received the most attention to date is the potential effect of development on the Porcupine Caribou Herd. The population of the Porcupine Herd is estimated to be 180,000 animals. The herd migrates annually between the United States and Canada, and gives birth to its young in the coastal plain of both countries. However, the herd has traditionally favored a particular portion of the 1002 area for bearing its young. This area has been depicted differently in the Department of the Interior's draft and final 1002 reports. The State is currently working to reconcile those differences, and will advise Congress of its results.

In the meantime, the State has concluded that this calving area is important because of its recurrent use by maternal females and because there are indications that females calving in this area have a higher reproductive success than females that calve in other areas. Observations of recurrent use of a specific calving area are not unique to the Porcupine Herd--a number of Arctic herds also demonstrate this trait.

The State believes the herd's use of the core calving area could be disrupted if oil and gas is developed there. This conclusion also was reached by 13 caribou biologists from Canada and Alaska who attended a workshop sponsored by the U.S. Fish and Wildlife Service which specifically dealt with the issue. Any disruption would occur primarily during the development and production phases since exploration would most likely occur during the winter when the herd is not on the Coastal plain. Modern exploration techniques will protect tundra habitat for subsequent summer use.

Disruption of the caribou's use of the core calving area could affect the population, although it is not possible to predict the magnitude of such an impact. This conclusion is based upon the professional judgment of State and other caribou biologists rather than on definitive scientific evidence. For this reason, the State recommends that leasing be deferred in the core calving area for a 10 year period following enactment of legislation which opens ANWR so that further information may be gathered.

During this time, the federal and state governments would jointly study the importance of the core calving area to the herd. This research would compare the physical and biological attributes and caribou use of the core calving area with peripheral calving areas. The study would evaluate the importance of characteristics such as snow cover, topography, vegetation, and predator distribution to calf survival in the core and peripheral areas.

After seven years, the results of this research would be summarized and presented to Congress. With this increased knowledge about the importance of the core calving area, supplemented with the additional information being collected on the response of the Central Arctic Herd to development of Prudhoe Bay, a more informed decision could be made about oil and gas leasing in the core calving area. Under my proposal, the Secretary of the Interior would be authorized to lease in this area, if Congress did not prohibit such leasing by the tenth year.

The State's comments to the Secretary of the Interior on the Draft 1002 report contain additional recommendations regarding mitigation of development impacts on the Porcupine Caribou Herd. Our comments also suggest a responsible approach for conserving other wildlife and fisheries resources in and adjacent to ANWR.

WASTE MANAGEMENT AND AIR EMISSION CONTROLS

The exploration and development of petroleum produces a number of waste products which must be properly managed to protect the environmental quality of the area. The oil industry has two decades of exploration and development experience on the Arctic Slope. During this period, technology and operating practices have evolved considerably. This experience has clearly demonstrated what works in the Arctic environment and where improvement is needed. Similarly, federal and state governments also have been developed to protect the environment more effectively.

For example, discussion has already focused on the effects of possible development on air quality in ANWR. The State believes that while additional oil and gas production facilities on the North Slope will increase local air emissions, proper permit review, inspection, improved technology and compliance procedures should result in protection of air quality well within ambient air standards.

This conclusion is supported by a study now being conducted by the industry and state government on air quality on the North Slope. Preliminary data indicate that the ground level concentration of air pollutants is considerably lower than expected. Specifically, actual levels of nitrogen dioxide are less than 20 percent of the public health standard. In addition, the State is examining ways to reduce the localized visibility problems caused by flaring.

In a similar vein, we are in the final stages of developing new solid waste regulations to cover the handling and disposal of drilling muds.

In sum, the State believes that the track records of both industry and government regarding development and the regulation of development on the North Slope have been positive, and we can assure the Committee that Congress has at its disposal the technology and the regulatory tools necessary to protect the coastal plain's environment. To assist you in this effort, I have directed the Alaska Department of Environmental Conservation to analyze the experience of North Slope development to date. That analysis will help put this technically complex issue into perspective and will provide a context for evaluating information provided by other interested parties.

STATE REVENUE SHARING

Under the Alaska Statehood Act and the Mineral Leasing Act of 1920, the State receives 90 percent of the governmental share of bonuses, rentals, and royalties derived from oil and gas leasing within wildlife refuges. We oppose any changes to this revenue sharing formula for several reasons.

First, Congress applied the Mineral Leasing Act to Alaska in Section 28(b) of the Alaska Statehood Act, and considered this to be a major provision of that Act. Because provisions of a Statehood Act are agreed to and binding upon both the United States and the affected state, Congress cannot act independently to change those conditions.

Second, modification of the funding formula would discriminate against the State of Alaska. Other western states also receive the equivalent of 90 percent of revenues from mineral leasing which occurs on public lands. These states receive 50 percent directly; another 40 percent is invested in the Reclamation Fund, which finances reclamation projects within western states, excluding Alaska.

Third, changing the revenue sharing formula for Alaska would set a precedent for altering other revenue sharing arrangements which benefit a number of states. These programs reflect a philosophy of land management which the Congress has consistently applied since the turn of the century.

Finally, a reduction in the State's share would come at a particularly difficult time in Alaska's history. With the marked reduction in the world price of oil upon which Alaska is so dependent, our people are experiencing depressed economic conditions including high unemployment, mortgage foreclosures, and cutbacks in state services. In these circumstances, to reduce possible revenues from development of ANWR would represent an especially hard blow.

We understand that many of you are planning to visit ANWR this summer. I hope that all of you can make it. I think you will find that your visit will give you a valuable frame of reference in your future consideration of the important issues that will be raised as you move forward with legislation.

The coastal plain has the tremendous potential to contribute to this Nation's economic strength and energy security. If we begin now, legislation can be passed that will open the area to exploration, development and production. At the same time, we can provide the environmental measures necessary to protect and preserve the natural resources in the area. The State of Alaska strongly supports the opening of the 1002 area. We look forward to working with you and your staffs as you consider this important issue.

The **Chairman**. Thank you very much, Governor Cowper. You indeed did testify very well. I wish all witnesses would testify as clearly and understandably as you have about this subject about which you feel very deeply.

Governor, suppose I were to try to explain to somebody in Dry Prong, Louisiana, and there is a Dry Prong, Louisiana, about the Coastal Plain of Alaska, and I were to try to get over to them what the values of the Coastal Plain are. How would you put it if you were there and somebody has never seen the Coastal Plain? How would you describe those values?

Governor **Cowper**. Mr. Chairman, I would first off show them where it is, which is, of course, in the northeast corner of Alaska. It is on the northern side of the Brooks Range, and it is an immense coastal plain which basically is tundra, and it is frozen for approximately 9 months out of the year. There is some snow cover which varies according to the year. But in the summer it comes alive. There is a lot of wildlife there, a lot of birds, a lot of caribou, a lot of predators, and by the way, a lot of mosquitoes and flies, in case you ever go there.

It is also a very, very promising area for oil and gas development.

The **Chairman**. I am not talking about the oil and gas. Let us say what we have called the rape and scrape boys have been in to see this fellow from Dry Prong, and he is trying to describe whether to let him go, and the rape and scrape guys have been in there and say, look, there is nothing up there, it is just a plain, it freezes in the winter, it has flies in the summer. What would you tell him is important about this?

Governor **Cowper**. Well, I would tell him that in fact it is frozen and pretty desolate during about three-quarters of the year, but for the rest of the year it is an incredibly productive area. There is a lot of wildlife there which have used this area for many years, and it is a national wildlife range. The value of those wildlife have to be considered.

The **Chairman**. Now, let us talk about the wildlife. We know about the caribou, at least we know there are 180,000 roughly in the Porcupine herd. There are about a million caribou in Alaska, in how many herds, a dozen or so herds? More than that?

Governor **Cowper**. It is kind of hard to tell. They split off and wander, and———

The **Chairman**. They do not stay in one place necessarily?

Governor **Cowper**. They do not stay in one place, but there are, I think, six major herds, as I recall.

The **Chairman**. Do the other herds keep their calving areas in the same place all the time?

Governor **Cowper**. Some do and some do not.

The **Chairman**. By the way, all these caribou are genetically the same, are they not?

Governor **Cowper**. I would hesitate to answer, but my guess would be yes.

The **Chairman**. All right. Now, you say we should not allow drilling on the core calving area. Now, what in your view is the worst that could happen if we allow drilling on the core calving area?

Governor COWPER. Well, in the first place, it has to be pointed out that it is the normal practice of the industry to do its exploratory work during the winter when the animals would not be there in any event, so that would not be a problem. You could move a period of time for development activities also during the time when the caribou are not there, but production is another matter. That is going to go on all the time. You do not shut that off.

So I guess the worst possible situation, I suppose, would be one where production facilities are in the middle of the calving area and the females choose to go elsewhere because of the presence of the production facilities, and they wander down into an area where there is much heavier predation. There are more bears and wolves, to explain a little bit further. And the survival rate of the calf crop is affected substantially because frankly more of them are eaten. That is a problem that we think may be there. We do not know if there is or not, but this is why we want to do the study.

The second thing that we think that we see is that the vegetation in the core calving area may be for some reason more nutritious or easier to get at or something along those lines for the females who are, of course, in a weakened condition after they have given birth, and if they got driven down to an area which is, well, that is more difficult for them, it might once again affect the rate of calving and the survival rate of the calves.

The CHAIRMAN. Try to describe to us what is the worst that could happen. You have got a herd of 180,000. Would the herd be gone? Would it be cut in half if the worst happens?

Governor COWPER. I do not think anybody knows, Mr. Chairman.

The CHAIRMAN. What is at risk? Is the decimation of the herd at risk or——

Governor COWPER. That certainly is what the object of the experiments that we have designed would have in mind. We think there is some risk that there would be a substantial reduction of the herd.

The CHAIRMAN. I mean, when you say substantial reduction are you talking about most of it?

Governor COWPER. I do not know if anybody knows, Mr. Chairman. I doubt that it would be most of it. But the herd itself probably shows a long-term fluctuation over time in any event. Nobody knows for sure what causes it, but we do not want to add a man-made risk to the risks that are there in nature in any event.

The CHAIRMAN. Well, you did that at Prudhoe Bay, did you not?

Governor COWPER. Well, we did. We did indeed. It is a much smaller herd, however, and the herd tends to disperse probably a lot more than this particular herd.

The CHAIRMAN. How about the musk ox? Is there anything peculiar about the musk ox in this particular area of the Coast Plain?

Governor COWPER. I think their range tends to be out of the way of the prospective areas for drilling.

The CHAIRMAN. So the musk ox would not be at risk. Is anything else at risk?

Governor COWPER. Well, the caribou would be the species about which the State has the most concern. There are migrating birds that come in at various times but I think that can be——

The CHAIRMAN. Obviously we are going to ask the environmental community these same questions, and I expect that they will maybe put some special values on this area. But so far, is if fair to say that the only speccial value you have defined is the caribou?

Governor COWPER. We believe it is also a critical area for water fowl and other types of birds, but we think in terms of trying to make major adjustments to the very important exploration and development activities, I say major adjustments, we think that the main problem is with the caribou.

The CHAIRMAN. Could you explain the current position of the State on the proposed land exchanges in ANWR between the Department of the Interior and several Alaska native corporations?

Governor COWPER. Mr. Chairman, earlier this year the State was involved in negotiations and discussions between the Interior Department and the various regional corporations involved. The State was at the table. I have told my people to withdraw from those negotiations. I believe that those land exchanges are premature, that they can be discussed perhaps at a later date, but I think that the question of whether or not the refuge Coastal Plain should be opened up or not should be addressed before any judgments are made on land exchanges.

The CHAIRMAN. I very much agree with you, and have told that to the Secretary, I might say, who says that they are not actively going to go forward with that, but I would just as soon they drop all plans and all discussions of that while this matter is being discussed here with us.

One final question. What specific areas do you have in mind as the core calving areas?

Governor COWPER. Mr. Chairman, as I mentioned earlier, there is a lot of disagreement among the biologists who know about this area, about the exact location of these areas. They move around from year to year, and all you can do is spot them on a statistical basis. Unfortunately, we discovered very recently that the methodologies used have all been mixed together. Anecdotal information has been used. As I said earlier, some of the real data was destroyed by fire, and I would like the indulgence of the Committee to reconcile these various methodologies and come to the Committee with an interpretation of that data that makes some sense.

We plan to do that within the next 30 days. But I do not know if anybody could put together an area which absolutely is going to be used by most of the caribou every year. That would not be the case, but there is clearly an area within which many caribou congregate for most of the years that we have been able to get information on, so we would like the indulgence of the Committee in that respect.

The CHAIRMAN. All right. Thank you very much, Governor Cowper. Senator Murkowski?

Senator MURKOWSKI. I would defer to Senator Stevens, Mr. Chairman. He has got a committee hearing.

The CHAIRMAN. Yes, indeed. We are glad to have Senator Stevens here. Although he is not a member of this Committee, he is a valued Member of the Senate, and what State was that?

STATEMENT OF HON. TED STEVENS, A U.S. SENATOR FROM THE STATE OF ALASKA

Senator STEVENS. I spent many years here in this Committee, Mr. Chairman, and I appreciate your giving me the opportunity.

Governor, I am reminded of what my grandmother used to tell my brothers and sisters and me. She used to tell us we are a small family, and we could do all our arguing at home, but when we got out on the street we had better be together if we are going to be heard.

I believe that, as I said to you yesterday, that the views you have expressed will be accommodated by the process, and that you have a right as a Governor for us to accommodate to the extent possible the comments that you have taken, and we are looking now at a problem of whether or not to remove the injunction against leasing in this area that would lead to expiration, which, if there is a discovery, would lead to a development process following the construction of another pipeline because there will not be any development until there is a transportation mechanism. I think we would agree on that. About 100 miles over to the other pipeline, and then there would be a production period.

In other words, even if Congress allows the leasing to go ahead now, we are talking about probably 5 years before there would be real production. I would say that is a minimum.

You have indicated you want on behalf of the State a delay as far as time to delineate the calving area. The information we have that has been provided to us indicates that in all probability that would be very difficult to do to determine where the calving takes place for this herd. Forty percent of this herd calves in Canada before it comes to the United States this year. I do not know whether that is a possibility to determine now where that calving area is, what it is. I am not going to dispute your position that there is one because I do not known whether there is one there or not. The information that I have been given is that there probably is not one but if there is one it will take some time to delineate.

Now, I think the process is there right now for us to accommodate that work that you want to have done to delineate that calving area, if it exists, within the time frame that exists right now if it is a reasonable time frame. My hope is that we can emphasize to the Congress, and that is my reason for being here today. I apologize for not being here when you started and gave your statements, because I was at another meeting. I am managing a bill on the floor on our side and I have to get back there. But in terms of what we seek right now, just the exploration period, do you believe we have to delineate the calving area before we have exploration?

Governor COWPER. Well, I do not think that you have to do that. I think that if you are going to delineate the area in terms of this legislation that you have to do so in this bill. You know as well as I do that exploration activities usually take place during the winter when the herd is not there at all.

Senator STEVENS. I was going to get to that. So as a practical matter the delineation of the calving area if one exists ought to take place in my judgment after there has been a discovery where we see if there is any risk. We have had drilling all over the State and they have been dry holes. If you go out and drill a dry hole in what might be a calving area in the summer but you do it in the wintertime, there has not been any harm to the caribou. I do not envision exploration phase as being any risk to calving or to the caribou, because by definition they will not be there during the period of time when we drill wells. Would you agree with that?

Governor COWPER. I think that is probably correct, Senator. Earlier I had testified, I think it was before you came in, that the risk would involve production, and not exploration and usually not development, even, or at least the development phase of it could be put in a time frame that does not coincide with the caribou migration.

Senator STEVENS. But if we join together with you and ask the Congress to allow the exploration phase to take place, to allow the development phase to take place, but with assurance that if during that period it is determined that there is a calving area, that there are adequate protections to ensure against risk to the caribou in the calving period and when they are on the Arctic Slope, as far as that is concerned, would that meet your needs?

Governor COWPER. Well, that is the objective, Senator. We are all trying to get to the same point, and we are trying to set up some rational way of getting there, and I know it is difficult to define the calving areas. Everybody understands that, but that does not mean they are not there.

Senator STEVENS. The thing I am worried about is that people are going to take their testimony and say, we ought to put this on ice until we can determine where the calving area is. I believe that, as I said, you are the Governor, and people of our State have elected you to express the position of the State on matters such as this. And from my own point of view, I am going to accommodate your desires, and they are my desires, too, by the way.

I have already told the industry as far as I am concerned if there was any proof of any harm to the caribou while they are in the calving period, we ought to just close down the industry even during the production phase if it would harm the caribou. You know, I should tell you, Mr. Chairman, this area was set aside. You ask what is special about it. It was set aside by the Secretary of the Interior at the request of the Fairbanks Women's Garden Club. They wanted a portion of the Arctic preserved so that we would have a representative area of the flora and fauna of Alaska. That was during the Eisenhower administration, almost 30 years ago now.

It has been enlarged to almost twice its size, but it still was originally an Alaskan desire to preserve a portion of the Artic as undisturbed as possible. At the time, however, oil and gas exploration was permitted specifically. Now, I think we have got to work out what the Governor wants, Mr. Chairman, in some way, but I am hopeful that neither one of us will leave the impression with the Congress that the process we are seeking now, that is, the exploration phase to commence, should be held up while we determine where this calving area is if one exists. Now, would you agree with that, Governor?

Governor COWPER. Senator, that is not my position, and I think it was fairly clear. I have very clearly enunciated the fact that my administration strongly supports the exploration and the development and the production if we are that fortunate of oil and gas from the Coastal Plain.

Senator STEVENS. What? That is not your position? I thought I just stated your position.

Governor COWPER. We said that clearly, and we said that there was an area in which the caribou congregate usually, and that we thought that we ought to take a look at that area and see if production, in particular, is going to affect the calving activities that usually take place in those areas. I mean, I do not think that is an unreasonable position. What you can do is to set up——

Senator STEVENS. Governor, let me interrupt you.

Governor COWPER [continuing]. A simulation of production facilities and see what the caribou do. They are either going to stay there or they are going to run off.

Senator STEVENS. I do not have any objection to that, but do you want to hold up exploration until you do that?

Governor COWPER. I do not have a problem with exploration, Senator, It is the——

Senator STEVENS. I know, but this bill is dealing with just the exploration phase. All this bill would do is remove the suspension that is contained in the 1980 Act of the right to lease the area for oil and gas. That is the basic need. The current law prohibits leasing of the area until Congress approves the Secretary of Interior's report, and this is an oversight hearing on that report. All I am saying is that I think we are in agreement. You say it is not your position. I think that we are in agreement. The exploration phase ought to go ahead. We ought to study the caribou, study their habits. If the development phase is going to interfere with the caribou calving or interfere with the caribou we ought to take action to assure that that will not happen. Is that not your position?

Governor COWPER. Well, my position has been stated in the statement there, and I think that it is clear that exploration activities if they are gone about in the way that they are normally gone about on the Arctic Coastal Plain they are not going to hurt the caribou because the caribou are not there. What we want to know, is the effect of production facilities on the calving areas of the caribou. I mean, I am not just the Governor of the oil patch. I am the Governor of the caribou as well.

Senator STEVENS. Well, I am the Senator of the caribou patch, too, Governor. [General laughter.]

Let us make sure we understand one another. I am trying to get together with you, and I want you to tell this Committee, if you will, that you are not going to oppose the exploration phase, and that the impression is here that the delay that you have requested means delay until we get the answers to what development might do to delay exploration. Now, I do not believe that is so. I think we had a conversation and we are in agreement.

Governor COWPER. Senator, if you can do exploration without figuring out a way to do exploration in that area without leasing it, then that is fine with me.

Senator STEVENS. Without leasing it there is no way. If you are saying that you want to——

Governor COWPER. When you have a lease you have to have not only the right to explore but also the right to develop. Now if you can get into that area——

Senator STEVENS. It is going to cost a billion dollars, Governor, a billion dollars to explore this area. I do not know of anyone who is going to put up a billion dollars, including the Federal Government.

Governor COWPER. I do not either. That is why I did not suggest——

Senator STEVENS. Unless they have a right to develop the area if they find oil. That requires a lease or a contract of some kind, you can call it a contract. It does not have to be a lease. At least a contract. But I hope we can get to the point not very long away, and I have got to get back to the floor, where we are going to say to the Congress, we want this area explored, and we want it developed, and we want production, and if the production is going to interfere with these caribou, we want the area where they will be delineated and we want the protections built into the law to assure that they will not be harmed.

Now, that is my position. I hope that you will agree with it as we go along. Again, I go back to my little grandmother. If you do not agree, there is not going to be any bill out of this Committee in my opinion.

Governor COWPER. I agree with your general position, Senator, but we are trying to reach some methodology here. That is my position, and there are dozens of others.

Senator STEVENS. Thank you very much.

The CHAIRMAN. Thank you, Senator Stevens.

Senator Murkowski.

Senator MURKOWSKI. Thank you.

I think, Governor, your opening reference to the area of the Coastal Plain deserves a little further attention, and for the record it is my understanding that the total acreage of the Coastal Plain is about 18,900,000 acres, which is a pretty significant piece of real estate. To put this in perspective, about 1.5 million are proposed in the leasing area as opposed to the total designated wilderness of about 8 million acres. My interpretation, Governor, of wilderness is that there is no permanent human intrusion.

Now, out of the balance of that 18,900,000 acres is about 8 million more, which is wilderness, and that means, I guess, limited access but virtually no development. So I assume it is your contention that this is a vast area overall, and from the standpoint of that acreage that is proposed for lease, it is relatively small and I think there have been some figures given. And I would ask whether you generally agree or not that if indeed out of the 1.5 million acres proposed for lease, out of the 18,900,000 acres, if it was all leased, Mr. Chairman, if there were development on each lease and pipelines and so forth, that it would utilize about 12,000 acres.

Governor COWPER. That is correct. That is my understanding. It would be widely dispersed, and it would not be a concentration of machinery and man-made objects. It would look like a very rural area, even if you developed every acre of it. That is correct.

Senator MURKOWSKI. I wonder if for the record you could give us your recollection of what remains as a consequence of the drill pad that was drilled near Kaktovik by, I believe, a joint venture between Chevron and the Arctic Slope Regional Corporation, because it was an exploratory well with no development authority, why, after they drilled, what happened?

Governor **Cowper**. It would be hard to tell that it was there.

Senator **Murkowski**. So it is pretty minor environmental impact——

Governor **Cowper**. It sure is.

Senator **Murkowski**. Could you draw any basic conclusion in the sense that that represented an exploration effort? Would it be similar to exploration efforts associated if the area was put up for lease and they didn't find anything?

Governor **Cowper**. Well, let us see if we can——

Senator **Murkowski**. I guess my interest is, how do you as a Governor in your State control oil and gas development, cleanup, oversight. You have pretty strict——

Governor **Cowper**. We sure do. I mentioned earlier that States had some 20 years of experience in regulating the industry, and its exploratory and development phases in Prudhoe Bay, and I think that while we made a few mistakes, anybody would have made a few mistakes, I think the record is very clear that we have done this in a responsible way, and when the industry closes down a facility, the country is returned to as close to its natural state as can be done under the circumstances. We are proud of our record.

Senator **Murkowski**. I am interested in your remarks concerning a response to the Chairman on a worst case basis of, you know, what happens if we did lease in ANWR and there was development and the development caused some displacement, and you indicated the concern would be over the calf survivability, and I think that is a concern obviously we all have.

The problem, I guess, at least from the standpoint of my examination, is the ability to get accurate information because of the wide dispersement of the caribou as they come and go as a migratory animal. I think you indicated that your concern was that if there was development which caused displacement of the caribou, the caribou might have to move and be subjected to areas where there are more predators, and as a consequence the concern would be resulting in more calves being killed by wolves and other predators. But is that not in fact actually contrary to what has happened in the Prudhoe Bay central herd where as a consequence of some explanation, whether it be the development that has occurred in Prudhoe Bay, that in reality the caribou have increased from 3,200, I think, in 1972 to over 13,000, 14,000 today? And do they not attribute some of that to the fact that this development has resulted in fewer predators? So I am just concerned with the contrast in your statement?

Governor **Cowper**. Let me put it this way. I hope you are right, but the terrain is different and the biologists tell me that if the caribou are displaced from the areas where they go right now, there is some reasonable possibility that they will be driven into an area that is closer to the high, to the mountains, and closer to bear and wolf habitat. I do not know. I do not think anybody knows. That is exactly why we have suggested that we do these tests. I mean, the best of all possible worlds would be if we put together a simulation of production facilities in these areas and the caribou do not do anything, they kind of like them.

That would indicate to me that if you put the same—put similar facilities there, production facilities, that there would be no effect whatsoever on the calving areas. That is what, frankly, a lot of people expect would happen, but we do not know.

Senator MURKOWSKI. That could be the case then. It is just that you do not know.

Governor COWPER. Sure.

Senator MURKOWSKI. But we do have a pretty fair track record from 15 years of observing——

Governor COWPER. That we do.

Senator MURKOWSKI [continuing]. Prudhoe Bay, and evidently there are more caribou and less predators, and those caribou have grown up in the environment of some development, and it does not seem to have disturbed their lifestyle.

Governor COWPER. I think that is correct, and I think that that is why the State concurs with many other parties that you do not need to treat this area in any different way except for the calving area.

Senator MURKOWSKI. Are you aware of the information that has come to some Members of the Committee concerning the activities of the caribou to date this season which indicates—the information we have that 40 percent of the herd has calved to date in Canada; the other 60 percent of the herd for the most part are still in Canada and are proceeding with calving and migration as well?

The CHAIRMAN. Forty percent of the Porcupine herd has calved in Canada?

Senator MURKOWSKI. This is the informatin we have this year, to date. Now, they are being——

The CHAIRMAN. Is that a typical year?

Senator MURKOWSKI. No, it is not. Excuse me, the question was directed at the Governor.

The CHAIRMAN. I am just wondering. Does 40 percent usually calve in Canada?

Governor COWPER. I do not think so, Mr. Chairman. That is a statistic that I do not know about. Maybe they know everybody is coming up to watch them this year. [General laughter.]

To respond in a little bit more serious manner, there are two years, 1980 and 1982, when the caribou herd did not even bother to come to Alaska.

The biologists once again are not certain, but they think that it had to do with a very deep snow cover, and that may be the case up there this year. I do not know. I have not been up yet this year. That may be the case. They are kind of contrary.

Senator MURKOWSKI. I understand that these figures have generally been agreed to by the state department of fish and game and U.S. Fish and Wildlife Service. I am not basing my reputation on the accuracy of this, this is the information I have.

And the reason being, as you have cited, Governor, I think a reference that about 90 percent of the slope of the Coastal Plain is still covered with snow, and that may have been the reason in the other years, as I have read some of the reports from the various biologists.

I understand as well that very few of the calves this year have been born in the general ANWR area, which we are still trying to decide where it really is.

From the standpoint of the concentration, the majority of the herd is still on the Canadian side of the border, and only a few caribou have reached what we generally refer to, whether it be yourself, Senator Stevens, or the Department of Interior, as the preferred calving area.

And I think it would be appropriate for The Chairman, with his concurrence, to have for the record whatever figures are accurate, ultimately this year would be very helpful.

The last question that I have, and it refers to, I think, the communication that you and the senior Senator had, and that is the question of exploration vis-a-vis production.

And I believe you testified that your concern is the disruption of calving during production, not necessarily exploration, because we agreed exploration would be done in a time where the caribou were not around.

Yet in your proposal you call for a 7 year study on calving impact in ANWR, and I guess the concern is, how can we have a 7 year study in ANWR before production begins? Because you are kind of conditioning, okay, this is an area I think we need——

Governor Cowper. Senator, that is not the import of my remarks. We think that production should take place in all of the areas of the Coastal Plain except the so-called preferred calving areas or core calving areas, or whatever you want to call them.

And in those areas what we wanted to do was to defer, actually defer leasing—that was our position—for that period of time, so that we could figure out what the effect of development and production would be on the calving area.

Now the rest of the territory there, we have got no problem with. And by the way, the indication is, while nobody knows for sure exactly where we are going to wind up with defining those areas, probably a couple hundred thousand acres, which is a pretty low percentage of the acreage on the Coastal Plain.

Now with respect to Senator Stevens' previous question, which you just brought up, about exploration, I do not have any problem with exploratory activities. The problem is that I was trying to be real about the oil industry.

I do not think anybody wants just a license to go up and do exploratory work. They want a lease. They want to be able to produce whatever they find.

And I think that the experience that we had in the national petroleum reserve, west of Prudhoe Bay, indicates that if you contract for the exploration of areas, you do not get much. I think you have to put some incentives in there, and that is what we were thinking about.

Now if it is the will of this Congress to somehow structure a program of exploration up there alone, then I would not see why you would have to accept the core calving areas, because they are not there when that exploratory activity takes place. They are in Canada.

Senator Murkowski. Well, I think you are aware that one of the difficulties we are going to have from the standpoint of the testimony of the state is to get a grasp on what the area specifically consists of, because in your formal testimony I think your reference is quite limited.

You indicate, however, the herd has traditionally favored a particular portion of the 1002 area for bearing its young. This area has been depicted differently in the Department of Interior's draft and the 1002 report.

The state is currently working to reconcile those differences and will advise Congress of its result. Now that, with all due respect, the extent of your identification of the area, which leaves it up to a future agreement.

And I can understand that. If you do not know, you do not know. But we are talking about authorizing exploration and/or development here, and we are going to have to address very soon the question of how much of the area is significant, and indeed how much of the area are we going to consider, and on what basis?

My experience in government is to the effect that it is much better if we have suggestions coming in from the people who are concerned rather than this Committee or the Federal government coming up with a proposed answer that you can live with.

I would much rather have your input, Governor, and that of the people of Alaska as to what they feel is the area, rather than us attempting to do that.

The other area that I want to mention very briefly is the matter which is covered in your statement, but I do not think you addressed, and that is revenue-sharing. There are various proposals that have been initiated from time to time to reduce the state's traditional 90 percent share of revenues from ANWR.

Would you consider it appropriate that the state be permitted to, say, share in the reclamation fund program, as other states do? I think Alaska is the only state that has its own 9/10. The rest of them, it is a 50-50 sharing back out of reclamation.

Governor COWPER. Senator, I would very much like for Alaska to share in that fund. By way of history, I do not want to be too redundant here, because it is in my written testimony.

But by way of the Statehood Act, Alaska was allowed a 90 percent share of revenues which were from areas such as the refuge here, from oil and gas production. The reason was that the rest of the country had a 50-40-10 split.

Fifty percent went to the state, 40 percent went to the reclamation fund, 10 percent went to the Federal government. But Alaska is not eligible to share in the reclamation fund, which of course is a fund that is very beneficial, particularly to the western states.

So in recognizing that Alaska does not share in that fund, we were allowed to take 90 percent, which is higher than any other state. That is correct. On the other hand, we do not get the benefits of the Reclamation Act.

And that kind of made up for it. But we think that that was a compact that was made at statehood, and that we should be allowed to continue under that provision.

Senator **Murkowski**. Mr. Chairman, I want to thank you for granting me the extra time. I have got one other area with regard to bringing it back to the state, but I am going to pass.

That is the 7 year proposal that it come back to Congress and Congress, I guess, would have a veto in the sense of if Congress did not prohibit such leasing by the 10th year. But I will forego that for another round. Thank you, Governor.

The **Chairman**. Senator Bradley?

Senator **Bradley**. Thank you very much, Mr. Chairman, and Governor, good to see you. I appreciate your testimony. I think it is very important testimony.

I want to just ask you two or three questions. As you know, one of the ideas that has been suggested is that there be a swap of land from within the ANWR for land on the outside.

I think the secretary of the interior has made such a suggestion. Would you support that idea, or do you have real reservations about that idea?

Governor **Cowper**. Senator, I testified earlier, by the way, that I do have considerable reservations about it. We think that any discussions at this stage of a land trade is premature.

That those discussions should at least be deferred until the Congress has decided the main question here, which is whether or not to allow the exploration and development and production of oil and gas on the Coastal Plain, and if so, under what constraints and stipulations.

We earlier had been a party to negotiations and discussions, which Interior had been doing with the various corporations, and we withdrew from those negotiations. We think it is just the wrong time sequence.

Those discussions, if any, ought to take place after the main question has been decided.

Senator **Bradley**. Well, that is extremely informative and helpful, and I thank you for that.

The second question that I have relates to your desire to have the question of whether or not to develop oil and gas areas within the ANWR. You believe that that should proceed, pursuant to the law under which this Committee is now working.

Governor **Cowper**. Yes, I do.

Senator **Bradley**. You would not want, in fact you would discourage the Congress, or the Executive, to be more precise, from any action that would circumvent this process, to open up the ANWR.

Governor **Cowper**. Well, Senator, let me put it this way. We have always assumed that any development activities that take place within this area would have to be approved by the Congress.

I think there are certain legal questions involved there that I am not qualified to answer. But we have always made that assumption, that whatever development activities take place would have to be approved specifically by the Congress.

That is something that is congenial to me. I think that is the proper way to decide it.

Senator **Bradley**. You would not want the whole question of development of the ANWR, for example, to be caught up in another battle related to the Executive and the legislative branches' respective responsibilities and powers. Is that not correct?

Governor **Cowper**. That is correct, Senator. I would like it kept as simple as possible.

Senator **Bradley**. You would like to have it dealt with in this Committee, and dealt with with as much open discussion and decision-making as possible. Is that correct?

Governor **Cowper**. That is correct.

Senator **Bradley**. You would not like to have an end-run in any administration on this issue outside the jurisdiction of this Committee. Is that correct?

Governor **Cowper**. Well, as I said earlier, we have always assumed that that would be the case. In all of our testimony and the action that we have taken has been based on the assumption that the Congress did have the authority and would exercise it.

Senator **Bradley**. And you welcomed that.

Governor **Cowper**. Well, certainly.

Senator **Bradley**. And that is why you are here today.

Governor **Cowper**. Well, it is one of the reasons.

Senator **Bradley**. Thank you.

The **Chairman**. Senator Wirth?

Senator **Wirth**. Thank you very much, Mr. Chairman, I am sorry not to have been here earlier, but delighted to have you here, Governor. Thank you very much for coming.

The day before yesterday, in discussing the potential environmental implications of opening up ANWR, Secretary Hodel told us that there would be in effect no problem, that what we would be doing is just following the example of the exemplary environmental programs that had been reflected in our activities in Prudhoe Bay.

Upon a little bit of pressure and questioning, it turned out that there had in fact been no Federal government monitoring in the Prudhoe Bay area of potential water pollution effects or air pollution effects or others. It turned not that in fact in Federal government was depending for its monitoring on the State of Alaska.

Therefore, it seems to me, that we ought to have a better sense than was provided by the Secretary of the Interior about the environmental modeling that you all have done related to Prudhoe Bay, what kind of efforts have gone in there, what kind of long-term examination and monitoring has been done in the Prudhoe Bay area.

Could you fill us in on that?

Governor **Cowper**. Well, I can certainly provide you with the specifics in writing. But first off, with respect to air quality, there is a concentration, an unusual concentration of gas turbines at Prudhoe Bay.

And as gas turbines do, they discharge certain nitrogen oxides. But the ambient quality of the air, with respect to those nitrogen oxides, is less than 20 percent of the allowable maximu. And there is of course an opportunity to reduce even that level through technological advances.

I am not here to tell you that Prudhoe Bay was a perfect operation. But I think it is in order for this Committee, and for the Congress, to understand that Prudhoe Bay was the first of its kind.

A lot of things were done sort of by trial and error. And since then the industry has learned a lot, the state has learned a lot. I think that in the aggregate, the performance of the industry and the regulatory functions of the state, have been pretty good.

I think that we can take the examples of Prudhoe Bay and translate that into what we have to do with respect to development on the Coastal Plain of the refuge. There have been technological advances.

Frankly, we believe that the industry should be required to use the best available technology, which is considerably more advanced than it was at the time that Prudhoe Bay was developed.

There are certainly questions that relate to the disposal of waste materials that we intend to take up with the industry.

We are in the process of doing that right now, to make sure, for instance, that the waste materials are properly disposed of without there being a leaching problem, to make sure that the pits are properly lined and that other precautions are taken, so that we do not have that problem of leaching.

Senator **Wirth**. I am not suggesting for a moment that you have not undertaken best efforts. I am only trying to understand the statement made by the secretary that what had happened at Prudhoe Bay, again, to summarize his statement, was a model.

If it was a model, therefore, we should have had extensive, it seems to me, data to prove that in fact it had been a model. When pressed it turned out that he did not have any information himself and on that front was dependent on the State of Alaska.

Therefore, the question is, what kind of full-time monitoring operations have you had over a period of time? Maybe you can provide that for the record, in terms of air and water.

If it is a model, we ought to therefore have the data to prove that it is a model. If the Interior Department does not have it, and they say the State of Alaska has it, then we ought to know what you have done and what data is available to justify the secretary saying that this had been a model program that ought to be followed at ANWR, since it was done so well at Prudhoe Bay.

Governor **Cowper**. Well, Senator, I do not know that I want to be in the position of having to justify all the secretary's comments.

Senator **Wirth**. No, I am not asking you to do that. I am only trying to understand what the secretary has told us. The Interior Department has come in to the U.S. Congress and said, please open this area up.

No problem. No environmental damage is doing to occur. We will just follow the exemplary model of Prudhoe Bay and everything is okay. So therefore I think it is a logical question.

I am not asking you to defend the secretary. I just want to get a sense of how do we know that this is a model program? Who has been looking at it? He tells us that they are not. They are depending on your data.

So therefore we ought to know what kind of monitoring has been going on there. Maybe we could get information from you about what kind of historic data collection, monitoring has occurred, particularly in the crucial areas of air and water pollution, by the State of Alaska in Prudhoe Bay.

Governor **Cowper**. Well, Senator, we will be happy to furnish the Committee with detailed information in that respect.

My commissioner of environmental conservation will be instructed to put that information together in some kind of inelligible form and to submit that to the Committee as soon as that can be managed.

Senator WIRTH. That would be helpful. I mean, I do not want to put a huge burden on you.

For example, it was my understanding, subsequent to what the secretary had testified to the day before yesterday, that in fact the State of Alaska has not had, until very recently, any full-time monitoring capabilities for understanding what has happened at Prudhoe Bay.

Now, maybe that is correct. Maybe that is not correct. But we have got to understand that.

Let me ask you one other question, if I might. The question has been raised as to what the precedent may be from the state leasing tide lands right off or ANWR.

In the leasing of those off-shore lands, there is, because of the proximity to ANWR and the fact that ANWR does not allow the refineries or any pipelines or whatever, that the leasing is in fact, some people have alleged, simply an attempt to increase the pressure on us to open up ANWR.

Can you clarify that for me? Is that a correct allegation? How do we respond to that allegation?

Governor COWPER. Well, Senator, that particular area has been on the state's leasing schedule for some years.

I suspect, though I was not there, that the commissioner of natural resources who put it there probably had in mind the future development of the Coastal Plain of the ANWR. I suspect that is the case.

But I do not imagine that that action would be very influential in terms of this body in trying to answer the main question. And we recognize that if ANWR is not developed, it is not very likely that that particular area in itself is going to be productive of commercial quantities of oil and gas.

But it is an area that we thought was promising, and we put it on the schedule. And frankly, I really did not see any reason to remove it. I could have.

I would like, Senator, if I may, to go back a couple questions ago and perhaps refine one of my answers, with respect to the performance of the industry in environmental matters that relate to Prudhoe Bay.

I do think it has been good. I think they have tried, they have made a good effort to do that. They have made some mistakes. But I do think that they have had a good record.

It is something you kind of have to see to appreciate. It is a very impressive set of facilities there, as well as the pipeline.

Senator WIRTH. I am not questioning whether it is or not. I only try to understand when the secretary comes up and says, this is a model program.

If somebody says it is a model program, great. What data do we have to prove that it is a model program? I just would like to understand what the basis is for a statement like that. It sounds good if you say it fast enough. But let us look and see if there is appropriate information underneath that.

I do not know, Mr. Chairman, if you got into the Chairman's idea of the split on potential revenues. Have you discussed that with the governor?

The **Chairman**. No.

Senator **Wirth**. I was wondering if you were familiar with the suggestion that has been made by The Chairman of the Committee?

Bennett, I do not want to be one to paraphrase your suggestion. Maybe you might just repeat that for the record, so that the governor is sure what your suggestion is, and we might get his comment on that.

The **Chairman**. Well, I have a bill pending, Governor, that would split the oil, if permission is granted, and that is very much an undecided question. We are not prejudging that at all.

But the bill would say that if we should allow drilling that the State of Alaska would get 50 percent, 25 percent to the Federal government, and another 25 percent would basically go for property acquisition, for the National Park Service, Fish and Wildlife Service, the Bureau of Land Management, and the Forestry Service.

The question to you, of course, would be, how do you feel about 50 percent to the State of Alaska? Is that too much?

Governor **Cowper**. Well, Mr. Chairman, 90 percent is always better than 50 percent. But we also recognize that 90 percent of nothing is nothing.

Let me put it this way. The Congress has the jurisdiction to decide that question. Our position is as stated earlier, that we entitled to a 90 percent share, based on a historical analysis of how that number got into the Statehood Act to begin with.

So I think perhaps I will let it rest at that.

Senator **Wirth**. Governor, I thank you very much for coming down and helping us out. And we look forward to working with you as we sort our way through it.

As you know, it is a very charged and difficult issue, and we apprecate your being here. Thank you very much, Mr. Chairman.

The **Chairman**. Thank you, Senator Wirth. Thank you, Governor. We appreciate your testimony.

Governor **Cowper**. Thank you. Mr. Chairman.

The **Chairman**. We have some more questions for you.

Senator **Murkowski**. I am wondering, Governor, if we can accurately ascertain this year the survival/mortality rate, based on wherever the caribou finally calve this year.

Does that give us an indication of what will happen if the caribou are displaced from a preferred area?

Governor **Cowper**. Well, I think that you would have to have some comparative numbers.

I think that probably the most valuable thing would be to see whether the caribou were displaced from the calving area by simulated facilities, and what happened once they were displaced.

Do they wander down into areas that are less, provide them less freed? Do they wander into areas where their calves are going to be eaten up by various——

Senator **Murkowski**. So we will have some information this year, because there are a lot of biologists up there.

Governor COWPER. We certainly intend to get some. We hope they come to Alaska as that we can experiment on them.

Senator MURKOWSKI. Governor, I think we are hung up a little bit on an issue, and I want to just one more time make reference to it.

Your testimony over your concern of disruption of calving during production, and your call for a 7 year study of calving impact in ANWR. And the concern that I have is, how can the 7 year study be done in ANWR before production, because only after production will you know the impacts?

So it seems like we are playing with a catch-22, and you have already indicated a reference that we can take examples from Prudhoe Bay. Why not instead use Prudhoe Bay. Why not instead use Prudhoe Bay, where we have had experience?

It is the only real experience we have had with production, and its impact on calving. It is a matter of fact, and we have got data on the Central Arctic Herd. We have got a major growth over 15 years.

I guess I am concerned with explaining to my colleagues how we get there from here under your proposal of a 7 year study, with the concern over calving and production. Yet only after production will we know what the impact is.

Governor COWPER. Well, let me rephrase it, I suppose. I do not propose, Senator, to in any way delay exploration, development or production in any area of the Coastal Plain other than those areas which are defined as being the core calving areas.

Now within those much smaller areas——

Senator MURKOWSKI. But you have indicated in your testimony it is a couple hundred thousand acres.

Governor COWPER. Well, that is what we think they will wind up being. Other than whose relatively small areas, we do not think were ought to be only delay in leasing. We would like to have it take place the day after tomorrow, if possible.

Now, within those areas, what we want to do would be to put simulated development and production facilities there, because that is where the risk is, and see what it does.

Senator MURKOWSKI. By simulated, you mean, what?

Governor COWPER. Well, you build something that looks like a production facility up there, and I do not know if you would put a tape recording in there and make it hum or what. Fortunately I am not in charge of that. And see what effect it has on the caribou.

Senator MURKOWSKI. Would you know what that spot consisted of previous, by whether there were caribou on that spot, so you would have a comparison if you put a simulated tent on it or something?

Governor COWPER. Well, we would have presumably defined the spots as being one of those where the caribou normally go. And you would have that facility there, and the caribou would either get up and leave or they would not come there, or they would. One or the other.

And you would be able to come to some conclusions as to what their behavior would be if you had an actual production facility.

Senator MURKOWSKI. We have that experience at Prudhoe Bay, and we have got some of it at Kaktovik with the activity there.

I am over my time, but I would appreciate, for the record, if you would give us some idea, as you are able to develop it, of defining the are a little more precisely. Because it is going to create a problem.

Senator WIRTH. Would the Senator yield?

Senator MURKOWSKI. Yes.

Senator WIRTH. Thank you. I do not know if you heard about the testimony two days ago, that the Interior Department solved the core calving area problem.

They just deleted it from the final report, and that was their way of solving the problem. So as you respond to Senator Murkowski, I just want to tell you there is another ingenious way for sorting through that complicated problem.

Governor COWPER. Well, it is just one of those things. Everybody knows it is there, and nobody can describe it.

It is a little like paraphrasing the remark about pornography that Justice Stewart make some years ago. But everybody knows that there is an area where a lot of the caribou come, probably a majority of them, during most years, when the conditions are more or less normal up there.

It is our job to describe it as specifically as possible, and all we can do is use whatever data we have to try to put it together the best that we can. It will not be exact. I know that.

Senator WIRTH. I thank the Senator for yielding.

Senator MURKOWSKI. The land exchanges have been brought up, and we are faced on the Committee with the reality of, is it in the national interest, say, to pick up the bear refuge on Kodiak Island that Kodiak holds, vis a vis allowing a land exchange in ANWR.

And the question of what is good for the Federal government is not necessarily what is good for Alaska. But in your opinion do these kind of exchanges make sense from the standpoint of having that kind of a refuge in the state? That is my last question.

Governor COWPER. We are not opposed to the concept of land trades. We just think they are little bit out of order in terms of this legislation.

We think that there may be a time when they ought to be considered. I am sure the Congress would like to take a look at additions to the refuge system. And maybe that could be something that could be taken up after some disposition has been made of this particular piece of legislation.

We are not opposed to it. We just think that the process is flawed, which is what we said earlier in the year.

Senator MURKOWSKI. I think it is evident that the process has to be approved by Congress. So when you say flawed, I am a little confused as to what your specific concern is.

Governor COWPER. Well. Senator, I was referring to the way in which the meetings to negotiate the land trades were taking place.

I felt that the state frankly was a second-class person at the table. I felt we did not have the kind of information that the other parties had, and we thought that it was simply a matter that needed to be taken up not before the legislation, which would decide whether or not to open up the Coastal Plain or not, but after.

We thought that things were simply out of place there, and we said so. And that is why I ordered my people to withdraw from the negotiations. I understand that there are other views. There always are in this business. That is the view that we had.

Senator MURKOWSKI. Well, I am wondering, if you take Kodiak as an example, just because it is one that is familiar to the Committee and the desirability of adding to the national land treasure this valuable bear refuge, what in your time frame is an appropriate time for Congress to take that up? Or other exchanges that are proposed to Congress?

Governor COWPER. Well, to the extent that I have got any control over it, which is none, by the way, I think the logical way to do it would be to first answer the question as to whether or not the Coastal Plain is going to be open or not.

Nobody wants any land in there, I do not think, except for the caribou, if it is not going to be explored and developed. Once that question is answered, then it seems to me that it would be in order to have an open process to discuss whether land trades would be in the best interest of the country or not.

Senator MURKOWSKI. So you are saying that if this Committee authorized the opening of ANWR, at that point you would not object to the discussion of exchanges.

Governor COWPER. Well, actually, we do not object to the discussion at any time.

Senator MURKOWSKI. Well, Congressional action. Congress has to address it if it is going to be viable.

Governor COWPER. It seems to us that the time to do it would be after the main question has been answered.

Senator MURKOWSKI. Which is once this Committee or once the Congress authorized the opening of ANWR, then you think it would be appropriate.

Because obviously if there is going to be a land exchange, it is going to affect the leasing proposals, because it is either going to transfer into private Alaskan ownership on an exchange basis, or it is going to be part of the overall leasing.

Governor COWPER. Well, in a time sequence, you could have the bill pass, and then discuss land exchanges, and then have a lease sale. You could do it that way.

Senator MURKOWSKI. That it correct. Would you propose that that would be an appropriate way? I am just trying to get the state's position on this.

Governor COWPER. Well, I am not proposing——

Senator MURKOWSKI. Well, it is important that we have for the record what the state's position might be.

Because it is a subject that has come up before this Committee, and there are proponents in the state, obviously, and you have heard from them and so have I. And there is interest on the part of the U.S. Fish and Wildlife Service to acquire these assets.

Governor COWPER. Well, there is nothing generic about the land trade that causes them to be not in the national interest.

As a matter of fact, a good case could be made, once a decision as to whether to open up the refuge or not has been made, a good case could be made that it would be in the national interest to trade off those lands within the refuge for lands that have a very high wildlife value, for instance, on Kodiak Island.

I think you could make that case, and I think that that case would rise or fall on its own merits, from the standpoint of the national interest. That is the way we look at it.

Senator MURKOWSKI. Finally, as the debate on leasing the Coastal Plain continues, there will undoubtedly be extensive discussions continuing on the impact of exploration on the Porcupine Caribou Herd.

If the debate demonstrates, Governor, to your satisfaction that there will be no detrimental impact on the population herd, will the state perhaps change its request for a 7 year delay in further Congressional review?

Governor COWPER. Well, the cart is kind of way out there in front of the horse on that one, Senator, We figure it will take us about 7 years to figure out whether there will be an impact or not.

If I were convinced today that there would be no impact on caribou calving through development activities, I would not have brought up the core caribou herd exemption to begin with.

My biologists, however, have told me that there is in fact a substantial possibility that there will be an impact on the survival of the calves. And that is the reason that we brought up this temporary deferral.

Senator MURKOWSKI. You had proposed to use the 7 years to simulate, to gather evidence. You would put simulations in the area.

Governor COWPER. Well, we think that at the end of 7 years we will have a pretty good set of figures and data to justify whatever conclusions we——

Senator MURKOWSKI. I understand that. You understand our problem, is the question of, you know, if we do authorize, what do we exclude?

Because there is a lack of definition in the Department of Interior, and there is a lack of definition from the state. And you are suggesting that we work together to address this in time, and we are certainly willing to do that.

Governor COWPER. Well, we were not planning on throwing the ball back in your lap. We were going to try to define those areas, with the best information that we have.

Our problem is that about a week or 10 days ago we discovered that conflicting methodologies had been used and then sort of thrown in the same pot and stirred up and then out come these very specific areas out of that pot. Well, it just does not work.

Senator MURKOWSKI. Well, and we are both aware that there is a significant influence from some of the extreme environmental groups that do not want any activity of any kind to take place in the entire Coastal Plain or any portion of the Coastal Plain, and they will use any excuse possible or any opportunity that would foreclose any opening of ANWR as we propose.

Governor COWPER. Well, I am sure that is correct, Senator, and I guess there are also people that do not care what happens to the Caribou. But I am constrained to do what I can for both sides.

Senator MURKOWSKI. I think we all are, and I think the Prudhoe Bay experience is one that is pretty nice to have behind us, because it has proven successful.

Governor, I want to thank you for you patience in responding to a broad area of questioning, and I think you have been very responsive and very knowledgeable. I have no further questions. I wish you a good day.

Senator **WIRTH** [presiding]. Governor Cowper, thank you very much. We were delighted to have you here. The record will be left open for your responses to questions asked by the Committee.

Senator **BUMPERS**. Mr. Chairman, can I just ask the Governor one or two questions?

Senator **WIRTH**. Senator Bumpers. Absolutely.

Senator **BUMPERS**. Number one, we had a little discussion here the other day about the White House signing off on exporting the gas from this area, and possibly the North Slope too, Prudhoe Bay too.

I am a little concerned about that. We had a figure thrown out here the other day that it would cost $30 billion to $40 billion to build a gas pipeline, to get that gas. Have you heard that figure?

Governor **COWPER**. Senator Bumpers, I have in fact heard that figurer. It relates to the northwest pipeline, the proposed pipeline that would go from Prudhoe Bay all the way through Canada into the American Midwest.

Senator **BUMPER**. It would connect with the line at Edmonton?

Governor **COWPER**. Yes.

Senator **BUMPER**. Those figures are just so staggering to me, I have a hard time accepting them. But then, I do not know. I have not seen a study, and I do not know how to evaluate that.

But in any event, one other thing. How much total revenue from bonuses and royalties has Alaska derived out of the Prudhoe Bay field?

Governor **COWPER**. Well, I am sorry you asked that question, Senator, because I do not have the exact figure. I think it must be——

Senator **BUMPER**. A bunch.

Governor **COWPER**. Yes, a bunch. I would say close to somewhere between $25 billion and $30 billion.

Senator **BUMPERS**. How would Alaska feel about reducing its share of the royalties from 90 percent to 50 percent?

Governor **COWPER**. Well, Senator Bumpers, earlier I had been asked that question. But my answer was that 90 percent is always better than 50 percent. But 90 percent of nothing is not worth much.

But that our position, the position of the State of Alaska, is that we are entitled to the 90 percent share by reasons of the Statehood Act. That, of course, was a compromise and it was understood to represent some compensation for the fact that we do not participate in the Reclamation Act.

Senator **BUMPERS**. I think your point is certainly well taken on that. Because we have a minor inequity here, and I do not want to get into this because it is a very provincial type thing.

But as you know the royalties and bonuses that go into the general fund here, 37.5 percent, used to go back to the states. It is 50 percent now. And I think most of the balance goes into the reclamation fund, but it does not necessarily go back to the state from where it came.

My guess is that Wyoming and Utah and Colorado produce most of the royalties for the treasury, and I would also guess that Arizona, for example, which is big in the reclamation project, gets the lion's share of that.

So certainly some of the states like Wyoming and Utah and other states that are producing the royalties would have a fairly legitimate squawk also. Would they not?

Governor **Cowper**. I think they would.

Senator **Bumpers**. If you and I were governors, of course, we both have been and are, just a few of us born to rule, as I say, we would be squawking. Would we not?

Governor **Cowper**. I expect we would, Senator. Every governor had better parochial.

Senator **Bumpers**. Thank you very much, Governor.

Senator **Wirth**. Thank you very much for being with us. Once again, the record will be open. Any additions you would like to add for the purposes of the record, we would appreciate hearing from you.

Governor **Cowper**. I would like to add before I leave that my administration stands ready to furnish any information that the Committee might require. We are very happy to cooperate with the Committee, and thank you very much.

Senator **Wirth**. Thank you very much. Our next witness is the mayor of the North Slope Borough, Alaska. And I believe that is the Hon. George N. Ahmaogak.

Mr. Mayor, we thank you very much for being here. If you might, Mr. Mayor, pull over the microphone. They are voice activated and you have to talk right into it so that everybody in the room can hear.

I am sure you are familiar with the rules of the Committee. We will include your statement in full in the record. We hope that you might be able to summarize that for the Committee in whatever way you think would be helpful.

We are delighted to have you here. Please proceed, and please remember the microphone. Thank you, Mr. Mayor.

STATEMENT OF GEORGE N. AHMAOGAK, SR., MAYOR, NORTH SLOPE BOROUGH, AK, ACCOMPANIED BY BILL GARNER, WASHINGTON COUNSEL

Mr. **Ahmaogak**. Thank you, Mr. Chairman. I have with me Bill Garner, our Washington Counsel. I have submitted a more lengthy statement for the Committee record. With your permission I would like to summarize it here.

As mayor of the North Slope Borough and a successful Eskimo whaling captain, I think I can help you understand two sides of our life in the North Slope Borough. One side cultural, built around the pursuit of gain, and the other our cash economy.

A portion of the food supply of most native residents of the North Slope Borough, and particularly those at Kaktovik, is supplied by hunting and fishing, primarily for whales, seals, birds and caribou. Our cultural life is tied strongly to these pursuits.

The exploration phase of oil and gas drilling in the Coastal Plain of Arctic National Wildlife Refuge would not have much effect on our subsistence activities or the tundra, because it is done in the winter time.

But development and production activities in ANWR would impact our subsistence resources, both on-shore and off-shore. Despite potential problems, I support a decision by Congress to open the Arctic National Wildlife Refuge to oil and gas leasing.

For a very long time we borough officials have been involved in the smallest details of on-shore and off-shore oil and gas developments. But we have adapted, and so has our wildlife.

Our people come to rely on borough government to protect their interests. And I think that the majority of our residents would support Arctic National Wildlife Refuge leasing, because they know we are there to watch out for their interests.

Therefore, we ask you to ensure a continued voice for local government in planning and permitting Arctic National Wildlife Refuge exploration and development.

You should recognize the facts that vehicle traffic to and from sealift docks could affect whale migration. Docks and waterflood causeways can change in fish migration. We will strongly oppose arbitrary closures of areas around oil field facilities to subsistence hunting.

I urge each of you to come to the North Slope this summer. You should see how carefully the oil fields are built in the Arctic. Also, you would see that we live in the modern world, made possible by North Slope Borough expenditures, funded largely by oil field property taxes.

Those tax revenues are in a rapid decline. Tax receipts from ANWR would come in after ANWR starts to impose burdens on municipal government. So development of ANWR will require that you provide impact aid, and that you put it to work when the impacts are felt.

Not everyone on the Slope supports ANWR leasing. I am a little suspicious whan I hear that Ottawa does not want us to risk change in Arctic National Wildlife Refuge. I wish they had shown as much concern when the Canadian people interferred with our whaling migration.

But when we talk to natives in Canada and in the Arctic Village and Venetie, we find that ANWR leasing brings out a fear of the unknown, and of a change in the lifestyle. I understand that fear. And it has to be dealt with where it has some basis.

I do not think those fears are justified. Ratifying the Caribou Treaty would help by opening up discussions at the local level before any problems arise with production and development in ANWR.

As I look to the future, I see our young people leaving the North Slope Borough because they can not find jobs, because they will not turn to welfare or try subsistence. We face this fact even without Arctic National Wildlife Refuge leasing.

I am no expert on questions of national energy security. But our North Slope oil production is about to go into a decline. Low oil prices and national environmental policy keep our more promising discoveries from being developed, and some of our oil fields suspended.

Some say this trend is inevitable. But I see no good environmental reason why ANWR can not be leased, and our North Slope economy and culture maintained.

That concludes my summary of my statement, and I would be happy to try to answer any questions.

[The prepared statement of Mr. Ahmaogak follows:]

TESTIMONY OF
GEORGE N. AHMAOGAK, SR.
MAYOR OF THE NORTH SLOPE BOROUGH, ALASKA
BEFORE THE
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
ON THE POTENTIAL OPENING OF THE COASTAL PLAIN OF ANWR TO OIL AND GAS LEASING
JUNE 4, 1987

On behalf of the residents of the North Slope Borough, Alaska, I want to thank the Committee for this opportunity to testify on ANWR. I have come here today to explain some of the concerns that I and the residents of the North Slope think you should deal with if you open the Coastal Plain of ANWR to oil and gas leasing.

In November of last year I announced my support for leasing in the Coastal Plain. This came after years of personal and governmental experience in balancing the need for oilfield exploration and development with the maintenance of wildlife, which are central to my Inupiat life and the subsistence of my people. From this personal experience, and from years of analyzing scientific and traditional knowledge, I and other Inupiat leaders know better than most the practical effects that onshore oil and gas exploration and development can have on the fish and game of the North Slope. The North Slope Borough used this information to develop its land use regulations, which are balanced to protect subsistence and allow development. We apply this experience and exercise our regulatory authority to continue this balance.

I am a successful Whaling Captain. I also hunt birds, fish, seals, caribou and other wildlife to feed my family. I am passing on to my children and to their children the knowledge to hunt and to subsist. Both are essential to our Inupiat culture and existence.

Before I became Mayor of the North Slope Borough, I was President of Ukpeagvik Inupiat Corporation, the Native Village corporation in Barrow. At UIC, I was a business leader and was closely involved with development on the North Slope. As Mayor of the North Slope Borough, I have been closely involved in the Borough's significant capital improvements program, and with the regulation of both that program and other development on the North Slope. This experience is fundamental to an understanding of the conflicts that exist in development on the North Slope and of the problems that must be resolved to make that development beneficial to all public interests groups. I can help your Committee understand this, and you must believe me when I tell you that I, and the people of the North Slope, are committed to controlling development so as to maintain subsistence resources and guarantee the continued cultural existence of the Inupiat.

I invite each member of this Committee to come to the Borough this summer to see ANWR and to visit with the residents of the North Slope. I hope you will make time to see how, with the urging of my people, environmental design of oilfield facilities have been progressively improved. Milne Point, Endicott, and Lisburne are examples of this improvement. You will see that exploration activities can be limited to a winter construction season, and that such development has no significant or permanent impacts on the environment or on wildlife. You will also be exposed to the accomplishments of our North Slope Borough government, which is relatively new, yet sophisticated in providing essential governmental services at the local level. These services can only be maintained if development continues to pay for the costs it creates.

Your visit to the North Slope will also help you appreciate how my people live in the modern world while keeping our culture and subsistence alive. Subsistence on whales, seals, fish, birds and other wildlife is a central part of our culture and daily sustenance. Many of us concentrate on teaching our children and grandchildren the ancient ways and methods. Our concern for maintaining subsistence guides our decisions and use of zoning authority in regulating development. The residents of our villages rely on our zoning and planning decisions in maintaining the quality of their lives.

The Borough has built and operates housing, health, schools, emergency, utilities, telecommunications, roads, and provides police and fire facilities. Building these facilities has made the North Slope Borough a dominant employer outside the oilfields. However, these public works projects are largely completed and the Borough is quickly shifting to an operations and maintenance budget. As a result, unemployment is severe in the native communities.

As oilfield and Borough employment decline, many of our people are relying more on subsistence and are becoming dependent on welfare or their families for cash. The Borough developed for its residents adequate housing and education facilities, along with the infrastructure to support those facilities. Our subsistence culture and lifestyle does not produce house payments, or operate our schools and maintain the infrastructure to support our schools. Neither my people nor any people could maintain a modern existence on solely a hunting and fishing style of life. If private sector and public employment is not available on the North Slope, our children will leave and our culture may die. You should not assume that we can or want to return to a substandard existence. The leasing of exploration rights in ANWR will help avoid such impacts.

I am not here to tell you that support for ANWR leasing is unanimous on the North Slope. But the leaders for the residents of the North Slope support continued development of oil and gas on the Slope, including ANWR.

I am not surprised that some have tried to exploit differences of opinion among residents of the State of Alaska. Though Arctic Village and Venetie are not within the North Slope Borough, some people there have expressed alarm that development of ANWR will significantly reduce their subsistence resources. I don't believe that their subsistence resources will be significantly impacted by exploration in ANWR. I believe that they have not been given the full picture. And as for development of ANWR, if oil or gas is found, my experience is that proper regulation will maintain subsistence resources. This should address their fears. If they could see and understand what the Borough government has done and can do to influence oilfield design, I think the majority of those villagers would not oppose ANWR leasing.

As for villages within the Borough, Kaktovik has the greatest potential to be affected by ANWR leasing. The Kaktovik Native Village corporation is represented here today, so I will not speak for my constituents at Kaktovik on whether or not they support ANWR leasing.

I will say that the Borough bears substantial costs and makes considerable efforts to provide for the social health and welfare of the people at Kaktovik. We have built and maintained essential public facilities in Kaktovik. The Borough will continue to maintain those facilities.

If Kaktovik Native lands near ANWR or in ANWR become a site for oil production activities, or if they serve as a base for development in the Refuge, the Borough has zoning responsibilities and will work in conjunction with the residents of Kaktovik to balance our subsistence way of life and mitigate the impacts of development.

I do have some concern over the development of the Coastal Plain in ANWR because there are limits to the jurisdiction of the North Slope Borough within the Refuge. As I stated earlier, we have a balanced approach to maintaining subsistence and providing for development through the exercise of our planning and zoning authority. The North Slope Borough has the same approach in our Coastal District Program, which has been adopted by the State of Alaska. However, NOAA has rejected this program, alleging that it does not adequately take into consideration the need for development of natural resources. We are working with the State of Alaska to learn the specific reasons for the rejection, since NOAA has not identified them. Approval of our Coastal District Program would help guarantee our input into development decisions and will reassure my constituency that their reliance on subsistence will not be threatened by development.

Finally, the North Slope Borough cannot rely on its shrinking financial resources to underwrite the increased costs for municipal services that development of ANWR will require. The Borough wants a firm guarantee of impact aid, delivered when it is needed. The State's redistribution of taxes on oilfield property provides the Borough its dominant source of funding, but that revenue is decreasing with depreciation and loss of population. Tax revenues from development in ANWR will come after demands on municipal services will be felt.

Until last year, and despite a lot of talk and statements of good intentions, the State and Federal governments provided little impact aid to offset the incremental costs of various federal oil and gas leasing programs on the North Slope. Last year, we obtained impact aid from NPRA leasing, but only after we sued the State. Congress has tended to defer these questions to the States, but over the years, obtaining impact aid from the Alaska State executive branch and legislature has been a frustrating experience.

A Congressional grant of impact aid that provided funding only from ANWR lease sale would necessarily provide aid only after that event and, therefore, after the Borough has been forced to put municipal services into place to meet increased demands. So, we ask that Congress provide a guarantee of impact aid for ANWR that is both timely and enforceable.

A process continues today, before this Committee, that will affect my people of the Arctic for the rest of their lives. I will strive to cooperate in every way. I gratefully acknowledge for myself and for my constituency the efforts you and your fellow Senators will make in deciding the future of the Coastal Plain of ANWR.

Senator WIRTH. Thank you very much, Mr. Mayor. Senator Murkowski?

Senator MURKOWSKI. Mayor, can you give us for the record the amounts of revenue that come in to the North Slope Borough and what you do with that money? Recognizing that it is in transition—nothing stands still. The old ways change. The ability to provide services from these revenues.

Could you give us some idea of what you have been able to accomplish for your people specifically? Services, hospitals, schools?

Mr. AHMAOGAK. Yes. Just to give you an idea of our operating budget for fiscal year 1988, we have the operating maintenance, operating budget for general government, and including the school district of about $100 million.

This $100 million includes emergency medical services, search and rescue, fire, housing, several other agencies that we have in the Borough that provide governmental services. Police protection and so forth.

Senator MURKOWSKI. And that is for how many residents, roughly?

Mr. AHMAOGAK. Our population, the certified count of the North Slope Borough, the latest count is 8,242. This total includes 5,306 in eight villages, 193 people in the military bases, 2,743 workers at Prudhoe, which the North Slope Borough is allowed to count as residents. The work force at Prudhoe totals about 7,016.

Senator MURKOWSKI. How many television stations can you pick up in Barrow?

Mr. AHMAOGAK. I did not quite hear you.

Senator MURKOWSKI. How many stations can you pick up? I have been in the schools and it seems like, they have got C–Span, all kinds of satellites capability for the people.

Mr. AHMAOGAK. We do have 13 channels that we are able to pick up.

Senator MURKOWSKI. Thirteen channels.

Mr. AHMAOGAK. Including our own telecommunications system.

Senator MURKOWSKI. And these have all been made possible——

Mr. AHMAOGAK. That is correct.

Senator MURKOWSKI. I assume that many of these things would not have been developed without the revenue base.

Mr. AHMAOGAK. That is correct.

Senator MURKOWSKI. So while you have the passing of traditions from the old ways to the new ways, there are misgivings at one part of the passing, and then there are the benefits of the new things and the new services.

And I suppose that reflects on the individual priorities of your citizens as they look at what this brings. It brings problems and it brings answers, and a melding of both.

Mr. AHMAOGAK. That is correct. Like I stated in my statements, we live in both the cash economy and the subsistence economy. Being able to do both, dealing with, as far as our experience is concerned, with Prudhoe Bay, knowing the majority of our revenue comes from there.

The property taxes that have provided a lot of the services. The government services that were provided has brought jobs. Capital improvement programs. And I think to look at both worlds I think we are able to live on both sides of the whole picture, from the subsistence lifestyle to the cash economy.

Senator **Murkowski**. Now you personally subsistence hunt and fish. So do you experience the traditions of the importance of maintaining a subsistance alternative opportunity for your people.

I am wondering if you can kind of give us an explanation from your point of view as to how you would explain the increase of the central Prudhoe Bay herd, which we have heard it was 3,500 in 1972 and is not 13,000 to 14,000. Your people utilize that herd for some subsistence. Why has it increased, and would not the same principle apply to the caribou, excuse me, the porcupine herd? Could you enlighten us on that?

Mr. **Ahmaogak**. As far as caribou herds are concerned, there are three types of herds. One, the porcupine caribou herd, that is one herd by itself. There is a central Arctic caribou herd, in the central Arctic. And also the western Arctic.

I think I do not have any details what the phenomenon is for the increase of the caribou. Probably because of less predators and more environment, more feeding grounds, is probably the rationale for a lot of the caribou, plus a lot of the other caribou that is mixed in from other geographical areas, are coming in as well.

They are roaming. They are not staying in one particular place, or calving in one particular area. But we do see a lot of changes in pattern from the central Arctic and the western Arctic. They are roaming continuously from the other known places.

As far as we are concerned, they are roaming all over and could calve in different areas as well, in other areas from different geographical areas, could come up from the southern end and join their forces.

Senator **Murkowski**. Do you have any opinion on the position of the State of Alaska with regard to the general statement that the state would like to withhold an area until they can determine whether or not it, in effect, is a concentration area for calving?

Or whether the caribou are just dispersed by nature? Or whether you feel the simulating of structures will have any scientific substantiation, that indeed these are sensitive areas and should be excluded?

Could you address, from your experience, this question that the Committee is concerned with? Where the Department of Interior says, well, they are so broad that it really is not a concentrated area and the state says that there seems to be one. And we are faced with the dilemma of——

Mr. **Ahmaogak**. Yes, Senator. Our position is not that of the State of Alaska. We feel that exploration, production and transportation of the resource should continue.

The core calving area, like I stated, as I understand the state wanted to designate that area by itself, is something that we do not agree. I think my statements earlier said that normally the core calving areas change from time to time, as we have seen in the Prudhoe Bay development.

Even with the exploration that was done there and the production phase that was there, the pipelines were specifically built and elevated so that there could be some migration.

I do not agree, as far as the 7 year study being done to allow for, to study the caribou first before the production is there. I think the production could be done continually.

But I think by all recommendations is that the state and the Federal government and the local government, from our standpoint, worked closely together to monitor these changes. And I think we have done that very well for Prudhoe and Kuparuk, and as well the Point Thompson area.

But I disagree. I would not want to see a 7 year study and allow for production facilities to be built later on. And I think they should continue.

I think we have done a fantastic job at Prudhoe. We have seen that experience. The caribou crossings were made successfully. And in fact the caribou are moving in and out of the Puparuk and Prudhoe Bay area. And I do not think it would impact us all that much.

Senator MURKOWSKI. So you do not support the 7 year study?

Mr. AHMAOGAK. I do not support that at all.

Senator MURKOWSKI. Mr. Chairman, I have no further questions.

Senator WIRTH. Thank you, Senator Murkowski. Mr. Mayor, we greatly appreciate your being here. Thank you very much, and we will keep the record open for any further comments that you think would be helpful to the committee, and will include your statement in full.

Mr. AHMAOGAK. Thank you.

Senator WIRTH. Our next witnesses are a panel. Mr. Oliver Leavitt, who is vice president of the Arctic Slope regional corporation, and Mr. Archie Brower, who is president of the Kaktovik Inupiat Corporation.

Gentlemen, we are pleased to have you here. Once again, I would remind you of the rules and procedures of the Committee in which we would ask you to summarize your statements, please, and we will include them in full in the record, and the record will be left open for questions and answers afterward.

We are delighted to have you here. Perhaps we might start off by identifying all of the participants at the table, if you might do that.

Mr. LEAVITT. Mr. Chairman, I am Oliver Leavitt, and I have with me James Wicker, counsel for the Arctic Slope Regional Corporation. And to my right is Archie Brower, the president of the Village Corporation of KIC, which is Kaktovik Inpuiat Corporation, and his counsel, Hugh Flesher.

In keeping with our tradition of the Eskimos, I would defer to my elder to testify first.

Senator WIRTH. That is a nice tradition which we sometimes have to observe in the U.S. Senate as well. Mr. Brower.

STATEMENT OF ARCHIE BROWER, PRESIDENT, KAKTOVIK INUPIAT CORP., ACCOMPANIED BY HUGH FLESHER, COUNSEL

Mr. BROWER. Thank you, Mr. Chairman. I am Archie Brower. To my right is our attorney, Hugh Flesher. I am an Inupiat Eskimo and have lived with my wife and children in Kaktovik, Alaska since 1956.

I am a whaling captain, past mayor of Kaktovik, and current president of Kaktovik Inupiat Corporation, which has 114 shareholders. In my community of 200 residents, the people, myself included, rely on hunting and fishing for subsistence.

And as most of us are Inupiat Eskimos I cannot emphasize too much our long tradition of protecting the land, its fish and wildlife. Our lives, our culture, our very survival, depend on how well we support and maintain our subsistence resources.

Given our strong concerns about protecting the habitat that gives rise to our fish and wildlife, Kaktovik Inupiat Corporation has taken a hard look at the Department of the Interior's Draft Assessment of how oil and gas development will affect the Coastal Plains surrounding our village.

After carefully considering the information and conclusions presented in the department's Draft Assessment, Kaktovik Inupiat Corporation supports the secretary's recommendation to allow leasing of the Coastal Plain area known as 1002 for oil and gas development, provided, however, that the residents of Kaktovik and other subsistence users continue to exercise their full subsistence activities in the area, which includes, for example, a right of access to the 1002 area to reach other subsistence resources.

Further, to ensure that our subsistence activities not be compromised, we expect and anticipate that all oil and gas development will be undertaken in an environmentally sensitive and prudent manner, and that proper regulations will be imposed and enforced to protect the habitat of our fish and wildlife.

As subsistence hunters of caribou, we especially support the utmost protection of the Porcupine Caribou Herd, and agree that these core areas most sensitive to the caribou be last leased.

In the event leasing should occur in the areas sensitive to the caribou, we urge that knowledge and experience gained from scientific studies and other oil development be applied to the developing of caribou sensitive areas.

Based on our experience with the oil industry, we believe that by applying appropriate safeguards, environmentally sensitive oil and gas development can occur.

Thank you for allowing me the opportunity to lend our support to the nation's oil and gas development, and to express our deep concerns about the protecting our land and its resources for present and future generations.

We trust that oil and gas development undertaken in the light of our values and respect for the land and its living resources will ensure that our small village and the entire nation continues to grow and prosper.

[The prepared statement of Mr. Brower follows:]

STATEMENT BY ARCHIE BROWER ON THE DEPARTMENT OF INTERIOR'S ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA, COASTAL PLAIN RESOURCE ASSESSMENT

June 4, 1987

I am Archie Brower. I am an Inupiat Eskimo and have lived with my wife and children in Kaktovik, Alaska, since 1956. I am a whaling captain, past Mayor of Kaktovik, and current President of Kaktovik Inupiat Corporation, which has 114 shareholders.

In my community of 200 residents, the people--myself included--rely on hunting and fishing for subsistence. And, as most of us are Inupiat Eskimos, I can't emphasize too much our long tradition of protecting the land and its fish and wildlife. Our lives, our culture, our very survival, depend on how well we support and maintain our subsistence resources.

Given our strong concerns about protecting the habitat that gives rise to our fish and wildlife, Kaktovik Inupiat Corporation has taken a hard look at the Department of the Interior's Draft Assessment of how oil and gas development will affect the coastal plains surrounding our village. After carefully considering the information and conclusions presented in the Department's Draft Assessment, Kaktovik Inupiat Corporation supports the Secretary's recommendation to allow leasing of the coastal plain area known as 1002 for oil and gas development, provided, however, that the residents of Kaktovik and other subsistence users continue to exercise their full subsistence activities in the area--which include, for example, a right of access through the 1002 area to reach other subsistence resources.

Further, to ensure that our subsistence activities not be compromised, we expect and anticipate that all oil and gas development will be undertaken in an environmentally sensitive and prudent manner, and that proper regulations will be imposed and enforced to protect the habitat of our fish and wildlife.

As subsistence hunters of caribou, we especially support the utmost protection for the Porcupine Caribou Herd, and agree that those core areas most sensitive to the caribou be last leased. In the event leasing should occur in areas sensitive to the caribou, we urge that knowledge and experience gained from scientific studies and other oil development be applied to the developing of caribou sensitive areas. Based on our experience with the oil industry, we believe that, by applying appropriate safeguards, environmentally sensitive oil and gas development can occur.

Thank you for allowing me the opportunity to lend our support to the Nation's oil and gas development, and to express our deep concern about protecting our land and its resources for present and future generations. We trust that oil and gas development undertaken in the light of our values and respect for the land and its living resources will ensure that our small village and the entire nation continue to grow and prosper.

Senator WIRTH. Thank you very much, Mr. Brower.

Mr. Leavitt.

STATEMENT OF OLIVER LEAVITT, VICE PRESIDENT, ARCTIC SLOPE REGIONAL CORP., ACCOMPANIED BY JAMES WICKER, COUNSEL

Mr. LEAVITT. Thank you, Mr. Chairman. For the record, my name is Oliver Leavitt. I am an Inupiat Eskimo from Barrow, Alaska.

I appear today in my capacity as vice president and a member of the board of directors of the Arctic Slope Regional Corporation. ASRC is one of the 12 regional corporations in Alaska.

ASRC has 3,700 Eskimo shareholders living in eight villages on the North Slope. Kaktovik Village is located on Barter Island.

The Kaktovik Inupiat Corporation, the village corporation for Kaktovik, owns 92,000 acres of surface lands within the boundarles of ANWR and adjacent to and partially within the Coastal Plain. ASRC owns the subsurface estate in these lands.

As the historic residents of the North Slope and the Coastal Plain, and as private property owners, our shareholders have important interests in the secretary of interior's recommendations and the decisions of the Congress on the future status of the Coastal Plain.

The village of Kaktovik, with 210 Eskimo residents, is located within ANWR, adjacent to the Coastal Plain. The people of Kaktovik are dependent on the caribou, on the sea mammals, and on the fish and wildlife resources of the Coatal Plain for their subsistence.

ASRC and KIC are the owners of the fee title to 92,000 acres, located within the ANWR and within and adjacent to the Coastal Plain area. And our Kaktovik private lands are highly prospective for major oil and gas discoveries and represent by people's best prospect to participate in the economic development of our ancestral lands.

Section 5, page 5, provides background on the ASRC and KIC's acquisition of the ownership interests in ANWR and the Coastal Plain. Our chronology on this subject is attached to my testimony.

The primary purpose of my testimony today is to convey on behalf of ASRC's 3,700 shareholders, and over views that the secretary, the administration, the Congress and the American people should join to accomplish two important goals.

First, in all fairness, permit the Eskimo the right to explore and develop the oil and gas potential of our 92,000 acres of privately owned lands within ANWR and within and adjacent to the Coastal Plain.

Second, as a matter of national policy, permit exploration and development of the potential vast oil and gas resources of the Coastal Plain of ANWR, subject of course to prudent regulations to protect the environment and the interests of the subsistence users and the fish and wildlife values in this area.

For my people, our lands in and near the Coastal Plain represent our best and perhaps our last chance to participate directly as owners in the economic benefits that the North Slope oil development has brought to our state and to the nation.

We strongly support the opening of the Coastal Plain to properly regulated and controlled exploration, development and production. My people have watched North Slope oil development very carefully over the past 20 years.

Years ago, we were apprehensive. But we have seen very impressive gains in planning and technology and in project execution over the years.

We believe the energy production facilities can be developed and operated in the Coastal Plain in a manner that is compatible with the very important fish, waterfowl, and wildlife species of the Coastal Plain.

This will, however, require careful regulation and it will cost money. But it can be done and should be done. While it is true that the Eskimo have direct economic interests as well as cultural, subsistence and other traditional interests in the decision to open the Coastal Plain, our interests do not stop there.

As Americans we believe there are larger and more important issues and values at stake here. The tragedy of the U.S.S. *Stark* incident in the Persian Gulf underlines the fundamental important issues presented, the human values at stake, and the suddenness with which assumptions about the economic security of oil import dependence can change.

In 1980 Congress, largely under the leadership of Senator Henry Jackson, and many of the members of this Committee, refused to designate the Coastal Plain as wilderness.

Instead, Congress designated the public lands of the Coastal Plain as a special study area and requested a detailed, 5 year study to determine whether oil exploration should be conducted compatibly with the needs and interests of the Eskimo subsistence users and the fish and wildlife resources of the area.

The Department of Interior's report and 20 years of North Slope operating experience answers these questions. The issues remaining involved policy and politics and choices about how to advance the national interest and our national security.

There is no question that the best on-shore prospect in the United States today is the 1.5 million acre Coastal Plain of ANWR. Even the National Wildlife Federation's expert geological consultant has found that the Federal and state projections of the Coastal Plain's huge oil and gas resource potential are too conservative.

Finally, there is a very real national need for the nation to get serious about energy policy. The million barrel a day loss in domestic production in 1986 must be stopped.

The sharp upward trend in oil imports dependency on OPEC and the Persian Gulf must be brought under control. And the gains made over the past 15 years in energy conservation and alternative energy must be restored and maintained.

the place to begin and the issue on which to show the world our national resolve is by opening the Coastal Plain to properly regulated oil and gas development.

Mr. Chairman, I ask that the full text of my testimony and the annual report prepared by ASRC be submitted as a part of the hearing record.

Senator WIRTH. Without objection, Mr. Leavitt, that will be included in the record, as well as any additional comments that you might like to make, or particularly that President Jacob Adams might like to add for the record.

[The prepared statement of Mr. Leavitt follows:]

OLIVER LEAVITT
VICE PRESIDENT
ARCTIC SLOPE REGIONAL CORPORATION

DEPARTMENT OF THE INTERIOR'S REPORT:
"ARCTIC NATIONAL WILDLIFE REFUGE:
COASTAL PLAIN RESOURCE ASSESSMENT AND
LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT"

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June 4, 1987
Senate Energy and Natural Resources Committee

1. Introduction

My name is Oliver Leavitt. I am an Inupiat Eskimo from Barrow, Alaska. I appreciate the opportunity to appear before this Committee on the Department of the Interior's Section 1002(h) Report on the future status of the 1.5 million acre Coastal Plain of the Arctic National Wildlife Refuge (ANWR).

By way of background, I serve as an elected Assemblyman for the North Slope Borough government. I am also a Member of the Arctic Research Commission. This Commission makes recommendations to the Congress and to the President on Arctic research priorities and objectives.

I appear today in my capacity as Vice President and a member of the Board of Directors of Arctic Slope Regional Corporation (ASRC). Our President, Mr. Jacob Adams has asked me to convey his regrets that an illness in his family prevents his appearance today.

ASRC is one of twelve regional Native corporations in Alaska. ASRC has 3,700 Eskimo shareholders living in eight Villages on the North Slope. Our Villages are located near the Canadian border in the east, near the Soviet Union in the west and in the Central Arctic. Kaktovik Village is located on Barter Island. The Kaktovik Inupiat Corporation (KIC), the village corporation for Kaktovik, owns 92,000 acres of surface lands within the boundaries of ANWR and adjacent to and partially within the Coastal Plain. ASRC owns the subsurface estate in these lands.

2. Background

ASRC and our Village Corporations were created pursuant to the Alaska Native Claims Settlement Act of 1971 (ANCSA). Enactment of ANCSA extinguished the Inupiat Eskimo people's "aboriginal title" to virtually all of the 56 million acres of land on Alaska's North Slope.

In compensation, the Inupiat Eskimo people were granted the right to select approximately 5 million acres of land on the North Slope and received a cash settlement to be paid over eleven years from Federal appropriations and State mineral revenues. Our right to select our land entitlement was, however, extremely limited. The best North Slope lands were not available to ASRC and its shareholders. The best lands had previously been leased to oil companies or selected by the State of Alaska. Other North Slope lands were set aside by the

Federal government for Wildlife Refuges such as ANWR, for military purposes such as the Naval Petroleum Reserve-Alaska, or placed in some other restricted status which limited or made them totally unavailable for selection by the Eskimo people.

In return for this settlement -- which was a necessary condition before commercial oil development could proceed after the 1969 discovery of Prudhoe Bay on the North Slope -- our claim of legal title to the oil fields at Prudhoe Bay, at Kuparuk, at Milne Point and in other areas was extinguished. These oil fields now produce almost 2 million barrels per day (B/D) of crude oil -- more than 20 percent of the Nation's total production. In 1985 alone, these fields produced crude oil worth in excess of $16 billion.

3. Subsistence Use of the North Slope's Resources

Like many of my relatives, friends and people, I am a subsistence hunter. The North Slope of Alaska is Inupiat land. As the land's subsistence users, my people are also the land's historic stewards and the guardians of its wildlife.

The Eskimo people of my generation have had to learn to live in two worlds. We have learned to speak English while, at the same time, we have tried to preserve our Inupiat language. We have accepted appropriate technology, but we remain subsistence hunters. We now have a cash economy, but we still live by the tradition of "sharing" which is the Inupiat Eskimo way.

Much of our life today is tied up in corporate activities, in managing our lands, in dealing with the State and Federal governments, and in trying to make a living in the cash economy (which is now deeply depressed) that North Slope oil production brought to the Eskimo people.

We have seen many changes. Some are welcome, some are not. Above all, we still try to live by our traditions, to maintain our culture and to teach our children respect for the traditional way and for themselves.

4. ASRC's Shareholders Interests in the Coastal Plain

As the historic residents of the North Slope and the Coastal Plain, and as private property owners, our shareholders have important interests in the Secretary of the Interior's recommendations and in the decisions of the Congress on the future status of the Coastal Plain:

- The Village of Kaktovik, with 210 Eskimo residents, is located within ANWR adjacent to the Coastal Plain;
- The people of Kaktovik are dependent on the caribou, on sea mammals and on the fish and wildlife resources of the Coastal Plain for their subsistence;
- ASRC and KIC are the owners of fee title to 92,000 acres of lands located within ANWR and within and adjacent to the Coastal Plain area; and

- Our Kaktovik private lands are highly prospective for major oil and gas discoveries and represent my people's best prospect to participate in the economic development of our ancestral lands.

Our interests in the Coastal Plain and our views are set forth in a report prepared by an ASRC subsidiary and issued in June of 1986. This report is entitled The Arctic National Wildlife Refuge: Its People, Wildlife Resources, and Oil and Gas Potential. I ask that a copy of the report be made a part of the record of these hearings.

This report is factual and objective in assessing the human, wildlife, economic and national security values the Congress should consider in acting on the recommendations of the Secretary of the Interior and in making decisions about the future use and management of the Coastal Plain. ASRC's views on policy issues are summarized in the Preface to the report by Mr. Jacob Adams, ASRC's President.

5. Arctic Slope Regional Corporation's Ownership of Kaktovik Subsurface Lands

On December 18, 1971, the Alaska Native Claims Settlement Act as enacted by Congress became law. ANCSA extinguished the aboriginal title and land claims of the Alaska Native people to most of Alaska and directed the conveyance of 44 million acres of land to Alaska Native corporations and cash payments in settlement.

The Native people of the Village of Kaktovik, located on Barter Island and within ANWR, established the Kaktovik Inupiat Corporation in 1972. Under ANCSA, KIC was granted the right to select 92,160 acres of surface estate. However, KIC was limited to selecting no more than 69,120 acres (3 townships) in the vicinity of the Village and was required to select the remaining 23,040 acres (one township) of its entitlement outside of ANWR because of an ANCSA provision (Section 12(a)(1)) limiting village land selections within units of the National Wildlife Refuge System to 3 townships or 69,120 acres.

Under ANCSA, ASRC was granted the right to select approximately 5 million acres of land on Alaska's North Slope. ASRC was, however, precluded from selecting lands within ANWR or the Naval Petroleum Reserve No. 4 (later redesignated National Petroleum Reserve - Alaska (NPRA)). Under ANCSA, regional corporations generally received the subsurface estate beneath the surface lands selected by each region's Village corporations. However, ANCSA prohibited ASRC from receiving title to the subsurface estate beneath those Villages which were located within ANWR and NPRA.

On June 29, 1979, ASRC and Secretary of the Interior Cecil Andrus executed a major land exchange and consolidation agreement, settling many outstanding conflicts between ASRC and the Department of the Interior arising under ANCSA. Included in the agreement are provisions that, subject to later Congressional approval, would: (1) permit KIC to exchange the 23,040 acres of surface lands selected outside of ANWR for an equivalent acreage to be selected adjacent to the existing 69,120 acres already selected by KIC near the Village of Kaktovik; and (2) grant an option to ASRC to exchange "in lieu" subsurface lands selected outside of ANWR and NPRA for the subsurface estate beneath the appropriate Village lands in those reserves if and when either reserve is later opened to oil and gas development.

The KIC exchange would permit the consolidation of the isolated acreage outside of ANWR with the lands already selected by KIC in the vicinity of the Village. The option to ASRC would permit the consolidation of the surface and subsurface estates in Native ownership, thereby assuring Native control of any development of the subsurface beneath Village-owned surface estate.

On December 2, 1980, Congress enacted the Alaska National Interests Lands Conservation Act (ANILCA). Section 1431 of ANILCA approved and ratified, as a matter of federal law, the June 29, 1979 agreement between ASRC and the Department of the Interior. Section 1431(g) of ANILCA allowed KIC to exchange the isolated acreage outside of ANWR for an equivalent acreage in the vicinity of the Kaktovik Village. Section 1431(o) of ANILCA granted ASRC the option to exchange "in lieu" subsurface lands outside of ANWR for subsurface lands beneath KIC surface estate if Congress opens ANWR to oil and gas development.

On August 9, 1983, pursuant to administrative exchange authority set forth in Section 1302(h) of ANILCA, ASRC and the Secretary of the Interior executed a land exchange agreement whereby ASRC conveyed 101,000 acres of surface estate at and near Chandler Lake in Gates of the Arctic National Park to the United States. As its part of the exchange, the United States agreed to convey to ASRC approximately 92,000 acres of subsurface estate beneath the surface estate owned by KIC. In approving this land exchange, the United States recognized that it could receive, in exchange for the KIC subsurface lands, valuable inholdings in Gates of the Arctic National Park at the time of the exchange. The alternative to the Department would have been to wait until the "coastal plain" of ANWR is opened to oil and gas development, at which point it would receive much less valuable "in lieu" subsurface lands from ASRC in exchange for the KIC subsurface lands. By executing the exchange in 1983, the United States was assured of receiving valuable National Park System inholdings for the KIC subsurface.

Attached to my statement is a chronology on the Kaktovik exchange for the information of the Committee.

6. ASRC's Policy Recommendations

The primary purpose of my testimony today is to convey, on behalf of ASRC's 3,700 shareholders, our view that the Secretary, the Administration, the Congress and the American people should join to accomplish two important goals:

First, in all fairness, permit the Eskimo people the right to explore and develop the oil and gas potential of our 92,000 acres of privately-owned lands within ANWR and within and adjacent to the Coastal Plain.

Second, as a matter of national policy, permit exploration and development of the potentially vast oil and gas resources of the Coastal Plain of ANWR, subject, of course to prudent regulations to protect the environment, the interests of subsistence users, and the fish and wildlife values in this area.

For my people, our lands in and near the Coastal Plain represent our best, and perhaps our last chance to participate directly, as owners, in the economic benefits that North Slope oil development has brought to our State and to the Nation.

The Eskimo people have more at stake in decisions about development on the North Slope than any other group of people in the Nation. As a result, we are careful students -- and at times have been strong critics -- of developmental activities proposed for the North Slope by both government and by industry. We have taken our views on these matters to the

Courts, to the State Legislature, to the Congress and to the negotiating table.

The Inupiat Eskimo people do not, however, oppose development of oil and gas resources on the North Slope as a matter of principle or philosophy.

We oppose development where it can't be done properly and and in a manner compatible with our fish and wildlife resources and our subsistence life style.

We favor development if it benefits our people and our nation and if it can be done in a manner that is compatible with our long-term interests as subsistence users in protecting the environment and the fish and wildlife values of the North Slope.

We strongly support opening the Coastal Plain to properly regulated and controlled exploration, development and production.

7. The Prudhoe Bay Operating Experience

My people have watched North Slope oil development very carefully over the past twenty years. Years ago, we were apprehensive. But we have seen very impressive gains made in planning, in technology and in project execution over the years.

Prudhoe Bay's record -- in spite of our initial doubts and concerns -- is a very good one. The Kuparuk oil field development record is better. We are convinced that the next major energy development project on the North Slope can be and will be even better. This is because industry is making real gains in planning, in technology and in operating knowledge in the Arctic environment.

As a result, we believe that energy production facilities can be developed and operated in the Coastal Plain in a manner that is compatible with the very important fish, waterfowl and wildlife species of the Coastal Plain. This will, however, require careful regulation and it will cost money. But it can be done and it should be done.

8. The National Interest

While it is true that the Eskimo people have direct economic interests as well as cultural, subsistence and other traditional interests in the decision to open the Coastal Plain, our interests do not stop there.

As Americans, we believe there are larger and more important issues and values at stake here. The tragedy of the U.S.S. Stark incident in the Persian Gulf underlines the fundamentally important issues presented, the human values at stake, and the suddenness with which assumptions about the economic security of oil import dependance can change.

The producing nations of the Middle East possess substantial market power in determining the world price of crude oil through their control of its supply. They exercised this power in October of 1973 and again in 1978 to greatly increase oil prices. They exercised this power once again in December of 1985 to significantly reduce oil prices. The actions of the producing nations were taken to enlarge their market share by forcing higher cost energy production in the U.S. and other nations to be shut in, and to reverse worldwide gains made in energy conservation and alternative fuels technology over the past thirteen years.

The OPEC member countries' recent use of their awesome power over world oil supply to control the price of the world's most important energy resource raises grave and fundamental policy questions for our Nation and for all Americans.

To maintain an acceptable degree of energy independence, the nation must explore and develop our best prospects on the public lands for major new "Middle East class" discoveries of "Prudhoe Bay" and "Kuparuk" dimensions. And, without question, the nation's best prospect for major new discoveries is the Coastal Plain of ANWR.

9. The Caribou Concern

Later today the Committee will hear the testimony of representatives of some interior Athabascan Indian Villages. The people of these Villages take caribou from the Porcupine Herd during the fall migration. They will express concerns about the potential impact of Coastal Plain oil and gas development on the caribou.

I do not agree, and the vast majority of the Eskimo people on Alaska's North Slope do not agree, with the positions they will advocate for the future of the Coastal Plain. We understand their concerns, however, and their fear of the unknown.

We were in their position in the late 1960's and 1970's. We heard and read the claims being made then that caribou would not cross the pipeline; that development of oil wells would disrupt calving; that there would be oil spills and massive pollution. At that time, we were concerned and we had fear of the unknown. And we voiced many of our concerns as these Athabascan Indians will do later today.

The Eskimo people ask that you hear these people's concerns, with sympathy and understanding. We also ask that you recognize that our fears of the 1960's and 1970's were proven groundless. The caribou in the Prudhoe Bay area have not declined; instead they have steadily grown in number. Other wildlife species did not suffer either. Those who predicted environmental disaster were proven wrong by the operating experience at Prudhoe Bay.

Yet, today, we hear the same claims, the same alarms, as if they were written by the same hand and pen; they produce the same uncertainty and fear in the Athabascan people that my people from the North Slope experienced many years ago.

When you, as Members of this Committee, make policy decisions to govern the future of the Coastal Plain, we ask you to look to facts, experience and history as the basis for your actions. Do not look to a fear of the unknown incited by charges long ago proven erroneous as a basis for public policy. Look, instead, to what is now happening in the Persian Gulf. Look at what OPEC power over production and price have done to our domestic energy industry. Look at the facts on declining domestic resources and production. Look at rising and dangerous import levels. Look at the balance of payments account for imported oil. Look at the lack of OCS development in our frontier areas.

On behalf of the Inupiat Eskimo people, I want to make a number of additional points for the record on the Department of the Interior's Coastal Plain Report and the Secretary's recommendations.

First, the Secretary of the Interior's recommendations for the future status of the Coastal Plain are proper and appropriate, they are based upon a factual record of successful operating experience, and they serve the national interest. We have minor differences with a number of the subjects contained in the report and we will submit detailed comments for the record.

Second, this Committee will hear, in the days ahead, conflicting testimony on the biological aspects of this report and on permitting exploration and development on the Coastal Plain.

I submit that the best experts on the impact of oil exploration and development on the North Slope, on the caribou, and on the fish and wildlife resources of the Coastal Plain are the Eskimo people. We have managed a subsistence living on these resources since time immemorial. We have endured the cycles of plenty and the cycles of scarcity for thousands of years. The Eskimo people will live on the Slope after the oil is gone; after the media has moved on to other issues; after the political interest has waned; and after the national environmental organizations have moved on to other issues to feature in their fund raising efforts, their membership drives and in their publications.

Third, over the past twenty-five years the Eskimos have seen major changes in our life style. In recent years we have, for the first time in history, been able to afford schools in our villages, jobs for our people, good quality housing, power plants to provide electricity, health services, fire protection, and, in some of our larger Villages, running water and sewer systems. These benefits -- which most Americans take for granted -- were made available only because North Slope oil development provided a tax base for our Borough government, and because economic activity led to contracts for ASRC and its subsidiaries and meaningful jobs for our shareholders.

Fourth, ASRC supports appropriate revenue sharing or impact aid for the North Slope Borough, for the Village of Kaktovik, and for other units of government impacted by development of ANWR's oil and gas resources.

Conclusion

In 1980 Congress, largely under the leadership of Senator Henry M. Jackson and many of the Members of this Committee, refused to designate the Coastal Plain as Wilderness. Instead, Congress designated the public lands of the Coastal Plain a special study area and requested a detailed five-year study to determine whether oil exploration could be conducted compatibly with the needs and interests of the Eskimo subsistence users and the fish and wildlife resources of the area.

The Department of the Interior's report and twenty years of North Slope operating experience answer these questions conclusively. The issues remaining involve policy and politics, and choices about how to advance the national interest and our national security.

There is no question that the best onshore prospect in the United States today is the 1.5 million acre Coastal Plain of ANWR. Even the National Wildlife Federation's expert geological consultant has found that the Federal and State projections of the Coastal Plain's huge oil and gas resource potential are too conservative.

Further, there is no real dispute that the Coastal Plain can be developed in a manner which is compatible with the area's important fish, waterfowl and wildlife resources.

Finally, there is a very real national need for the nation to get serious about energy policy:

-- the million barrel a day loss in domestic production in 1986 must be stopped;

-- the sharp upward trend in oil imports dependency on OPEC and the Persian Gulf must be brought under control; and

-- the gains made over the past 15 years in energy conservation and alternative energy must be restored and maintained.

The place to begin, and the issue on which to show the world our national resolve, is by opening the Coastal Plain to properly regulated oil and gas development.

Thank you.

June 3, 1987

CHRONOLOGY
ARCTIC SLOPE REGIONAL CORPORATION'S OWNERSHIP OF KAKTOVIK SUBSURFACE ESTATE SELECTED DATES AND EVENTS
1971-1987

1971

December 18	Congress enacts and President Nixon signs Alaska Native Claims Settlement Act (Pub. L. 92-203) ("ANCSA") into law. Kaktovik Inupiat Corporation ("KIC"), the village corporation for the Native village of Kaktovik, is granted the right to select 92,160 acres (four townships) of surface lands. Of this total land grant, however, only 69,120 acres (three townships) can be selected within the area withdrawn near the village. KIC must select the remaining 23,040 acres (one township) of its ANCSA entitlement outside of the Arctic National Wildlife Refuge ("ANWR"), the area where the Village is located, because of the ANCSA provision (Section 12(a)(1)) limiting village land selections within a unit of the National Wildlife Refuge System to no more than three townships.

Arctic Slope Regional Corporation ("ASRC"), the regional corporation for the Native residents of Alaska's North Slope, is granted by ANCSA the right to select approximately 5 million acres of surface and subsurface estate. ASRC is, however, precluded from selecting lands within ANWR, within the Naval Petroleum Reserve No. 4 (later redesignated National Petroleum Reserve - Alaska ("NPRA")) or within areas previously selected by the State of Alaska. Although regional corporations are, under ANCSA, generally conveyed the subsurface estate beneath their village corporation's surface lands, ANCSA does not allow ASRC to receive title to subsurface beneath village lands, such as Kaktovik, which are located within ANWR and NPRA.

ANCSA also confirms the State of Alaska's selections in the Prudhoe Bay area despite the aboriginal claims of the Eskimo people to these lands.

1972

March 15	Secretary of the Interior Morton withdraws approximately 12 million acres of the North Slope's 56 million acres. The lands withdrawn are outside NPRA, ANWR and State selection areas. ASRC is allowed to select its 5 million acre entitlement only from these withdrawn lands. Among lands withdrawn for ASRC selection are those surrounding Chandler Lake, the most spectacular large mountain lake in the central Brooks Range.

1974

January	KIC selects its 69,120 acre entitlement near Kaktovik Village.
November 6	ASRC makes a portion of its ANCSA land selections, including the Chandler Lake area selection.
December 3	KIC selects 23,040 acres outside ANWR's boundary about 85 miles southwest of Kaktovik Village. This completes KIC's 4 township (92,160 acres) entitlement.

1976

November 29	Bureau of Land Management ("BLM") conveys Chandler Lake area to ASRC. ANCSA Interim Conveyance No. 048.

1977

January 14	BLM issues interim conveyance and patent to KIC of surface estate selected near Kaktovik Village. ANCSA Interim Conveyance No. 052 and Patent No. 50-77-0046.

1978

March 28	BLM conveys 22,812 acres of surface estate to KIC of the 23,040 selection outside of ANWR (228 acres held back for survey purposes). ANCSA Interim Conveyance No. 085. ASRC receives conveyance of the subsurface estate. ANCSA Interim Conveyance No. 086.

1979

June 29	ASRC and Secretary of the Interior Cecil Andrus sign major land exchange and consolidation agreement. Included in that agreement are provisions that, subject to

later congressional approval, would: (1) permit KIC to exchange the 23,040 acres of surface estate selected outside of ANWR for an equivalent acreage of surface estate to be selected from lands contiguous, compact and adjacent to the 69,120 acres already selected near Kaktovik Village; and (2) grant ASRC the option to exchange "in lieu" subsurface lands selected outside of ANWR and NPRA for the subsurface estate beneath the appropriate village lands in the reserves if and when either of the two federal reserves (ANWR and NPRA) are later opened to commercial oil and gas development. The purpose of the KIC exchange is to allow consolidation of isolated and unused acreage outside of ANWR with those lands previously selected near and adjacent to Kaktovik Village. The purpose of the ASRC option is to consolidate surface and subsurface estates in Native ownership, thereby assuring Native decision-making about and control of any private development of the subsurface estate beneath village-owned surface lands.

1980

December 2 Congress enacts Alaska National Interest Lands Conservation Act (Pub. L. 96-487) ("ANILCA"). Section 1431 of ANILCA approves and ratifies, as a matter of federal law, the June 29, 1979 agreement between ASRC and the Department of the Interior. Section 1431(g) of ANILCA allows KIC to make the 23,040 acre land exchange to join that acreage with its original 69,120 acre selection near the Kaktovik Village. Section 1431(o) of ANILCA grants ASRC the option to exchange any of its "in lieu" subsurface lands outside of ANWR and NPRA for subsurface beneath appropriate village lands if and when Congress opens either reserve to oil and gas development.

Section 201 of ANILCA also establishes the Gates of the Arctic National Park in the central Brooks Range. Included within the new park boundaries are the Chandler Lake lands conveyed to ASRC three years earlier.

December 12 In the 1981 Department of the Interior Appropriations Bill (Pub. L. 96-514), Congress acts to open NPRA to oil and gas leasing, thereby triggering ASRC's rights under Section 1431(o) of ANILCA to acquire subsurface lands beneath the three villages located in NPRA.

1983

August 9 Pursuant to administrative exchange authority set forth in Section 1302(h) of ANILCA, ASRC and the Department of the Interior execute a land exchange agreement whereby ASRC conveys 101,000 acres of surface lands at and near Chandler Lake in the Gates of the Arctic National Park to the United States. As its part of the exchange, the United States conveys to ASCR approximately 66,000 acres of federally-owned subsurface beneath Kaktovik Village surface lands owned by KIC, and agrees to convey to ASRC the remaining 26,000 acres of subsurface (for a total of 92,000 acres) when KIC selects and receives title to its remaining surface entitlement. Exploration activities, including exploratory drilling outside of ANWR Section 1002 "coastal plain," on ASRC/KIC land are made subject to stringent environmental stipulations included in 1983 exchange agreement.

1984

February 6	ASRC enters into an agreement with Chevron, Standard (then Sohio) and British Petroleum for exploration of the Kaktovik subsurface lands. Exploratory drilling contemplated on Kaktovik subsurface outside ANWR Section 1002 "coastal plain," but no exploratory drilling allowed on Kaktovik subsurface inside "coastal plain." If Congress later acts to remove prohibition on oil and gas development within ANWR (Section 1003 of ANILCA), the agreement provides for development and production of oil and gas from these lands.
July 17	Congress enacts Barrow Gas Field Transfer Act (Pub. L. 98-366). Section 5(d) of the Transfer Act deems the Kaktovik subsurface lands conveyed, or to be conveyed, to ASRC pursuant to the August 9, 1983 land

exchange agreement as being conveyed and received pursuant to ANCSA land exchange authority.

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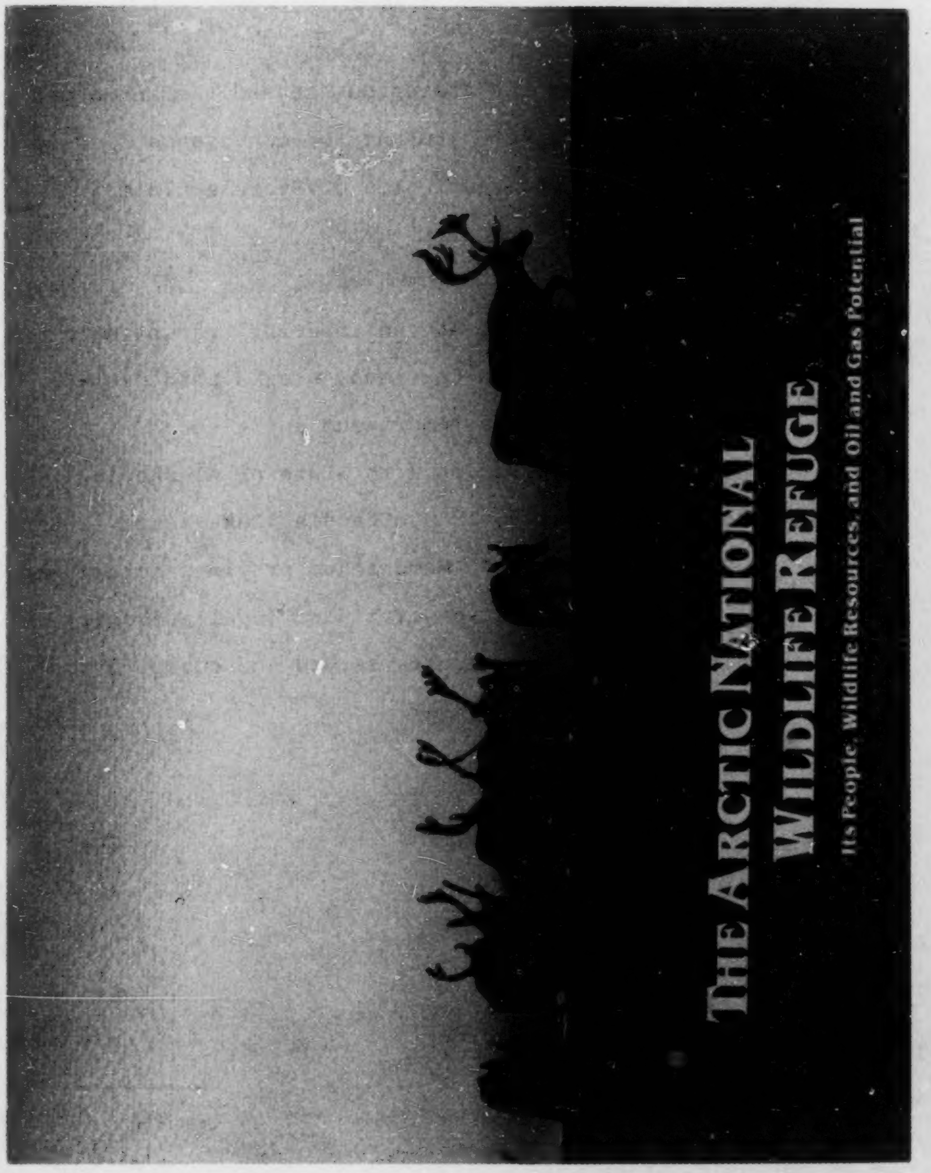
July 25	Bureau of Land Management issues an administrative decision authorizing conveyance to KIC of most of its remaining land entitlement. 51 Fed. Reg. 23159 (June 25, 1986).
August 8	BLM conveys 17,806 acres of surface lands to KIC. ANCSA Interim Conveyance No. 1209. ASRC receives conveyance to equivalent subsurface (pursuant to 1983 exchange agreement). ANCSA Interim Conveyance No. 1210.
November 7	BLM conveys 1,782 acres of surface land to KIC. ANCSA Interim Conveyance No. 1291. ASRC receives conveyance to equivalent subsurface (pursuant to 1983 exchange agreement). ANCSA Interim Conveyance No. 1292. The bed of the Jago River is excluded from these conveyances as State of Alaska has asserted ownership to river bed

under the Statehood Act and the Submerged Lands Act. Balance of conveyance held up pending resolution of State's claim.

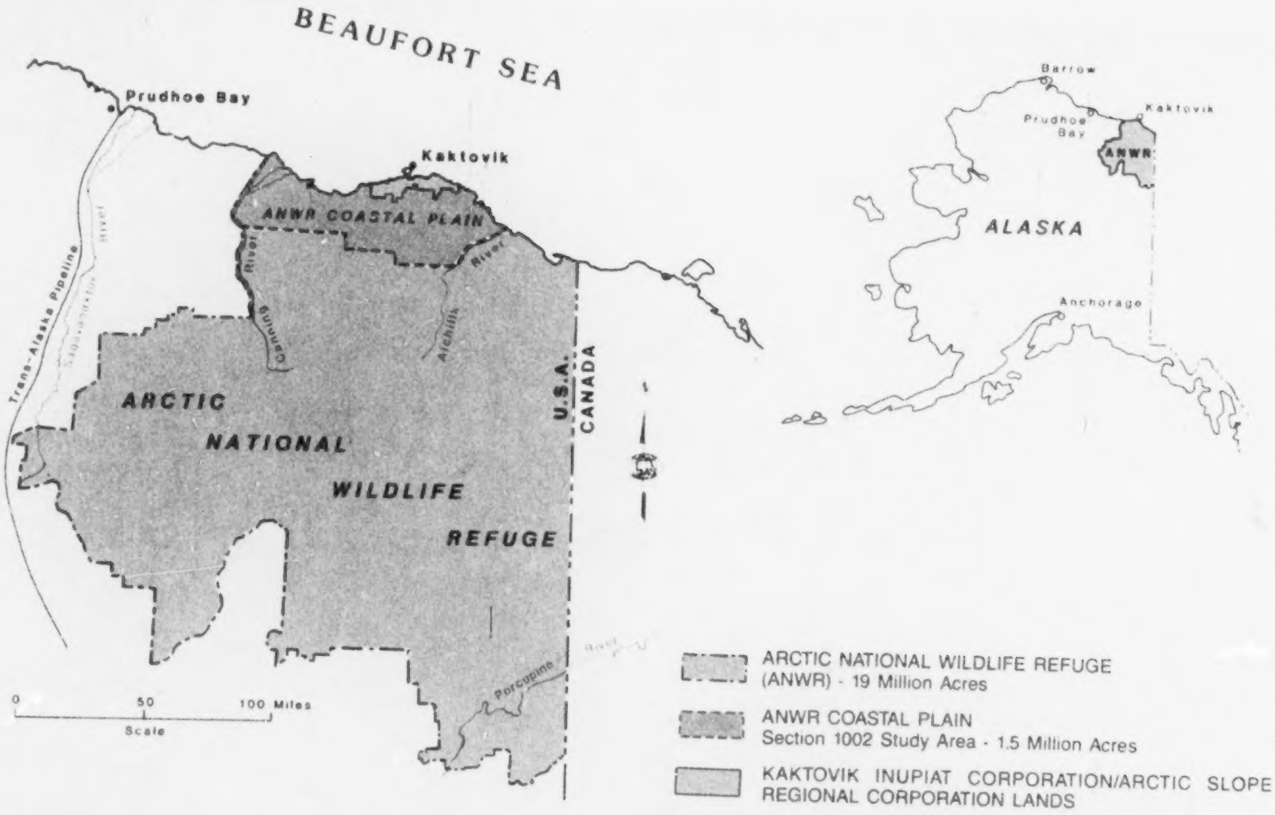
1987

March 23	Department of the Interior transmits to Federal Co-Chairman, Alaska Land Use Council, a memorandum entitled "Consultation With State of Alaska in August 9, 1983, Chandler Lake-Kaktovik Land Exchange." Memorandum provides details on chronology of exchange, legal authority, public interests served and consultation and review.



THE ARCTIC NATIONAL
WILDLIFE REFUGE

Its People, Wildlife Resources, and Oil and Gas Potential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Prudhoe Bay
Kaktovik
ANWR COASTAL PLAIN
Canning River
Aichilik River
Sagavanirktok River
Trans-Alaska Pipeline
ARCTIC NATIONAL WILDLIFE REFUGE
U.S.A.
CANADA
Porcupine River
0
50
100 Miles
Scale
Barrow
Prudhoe Bay
Kaktovik
ANWR
ALASKA
Anchorage
ARCTIC NATIONAL WILDLIFE REFUGE (ANWR) - 19 Million Acres
ANWR COASTAL PLAIN Section 1002 Study Area - 1.5 Million Acres
KAKTOVIK INUPIAT CORPORATION/ARCTIC SLOPE REGIONAL CORPORATION LANDS

NOTE: The Coastal Plain of ANWR (or Coastal Plain) defined here refers to the legally designated area specified in Section 1002 of the Alaska National Interest Lands Conservation Act (ANILCA). The generic term "coastal plain" refers to the lowlands of the North Slope which lie between the Brooks Range and the Beaufort Sea coast.

THE ARCTIC NATIONAL WILDLIFE REFUGE

Its People, Wildlife Resources, and Oil and Gas Potential

arctic slope regional corp.

Jacob Adams, President

PREFACE

Established by administrative action in 1960 as a federal conservation unit, the Arctic National Wildlife Range originally covered 8.9 million acres in northeastern Alaska. In 1980, Congress addressed the boundaries of the Range and the land management principles which should govern its future use in the Alaska National Interest Lands Conservation Act (ANILCA). Congress doubled the size of the conservation unit to about 19 million acres and redesignated the greatly expanded area as the Arctic National Wildlife Refuge (ANWR).

ANWR borders the Arctic Ocean and lies between Prudhoe Bay and the Trans-Alaska Pipeline 50 miles to the west and the United States and Canadian border to the east. In ANILCA, Congress also designated 8 million acres (approximately 45% of the expanded ANWR) as wilderness in accordance with subsection 3(c) of the Wilderness Act. Congress also identified an additional 1.5 million acres (approximately 8% of ANWR's total acreage) with high oil and gas potential in an area of ANWR near the coast of the Arctic Ocean referred to in ANILCA as the "Coastal Plain". The Coastal Plain was designated for further study of its wildlife and oil and gas resources to assist the Congress in a subsequent decision as to whether this area of promising petroleum potential should be:

1. opened to oil and gas development,
2. managed as a wilderness area; or
3. subjected to some other alternative management regime.

It is generally agreed that the 1.5 million acre Coastal Plain in ANWR contains the Nation's most promising onshore frontier area for major oil and gas prospects.

Since 1980, however, all public lands in the Coastal Plain have been withdrawn from operation of the mineral leasing laws and no development may be undertaken on the Coastal Plain until expressly authorized by an Act of Congress.

The Coastal Plain also contains important fish and wildlife resources. These resources are also the subject of further study by the appropriate agencies within the Department of the Interior.

The Section 1002(h) Report

Title X of ANILCA authorized and directed a number of studies and reports on the oil and gas potential and fish and wildlife resources of the Coastal Plain of ANWR. Section 1002(h) of Title X directs the Secretary of the Interior to prepare a report together with his recommendations ". . . with respect to whether further exploration for, and the development and production of, oil and gas within the Coastal Plain should be permitted . . ." The Secretary's report is to be submitted to the Congress by September 2, 1986. Congress will be called upon to review the Secretary's report and to decide the future management regime that will govern activities on the ANWR Coastal Plain.

The Native People's Interest in ANWR

The Arctic Slope Regional Corporation (ASRC), the Inupiat Eskimo-owned Corporation established pursuant to the Alaska Native Claims Settlement Act of 1971 (ANCSA), has major cultural, subsistence, and economic interests in ANWR. One of the North Slope's eight villages within ASRC's operating area, the Village of Kaktovik, is located on Barter Island within the boundary of ANWR. ANWR has been home to Kaktovik's 210 residents and their ancestors for many centuries.

In August 1983, ASRC exchanged to the United States title to 101,000 acres of surface lands that the Corporation had previously selected under ANCSA. As a result of this exchange, the National Park Service added to the Gates of the Arctic National Park significant private inholdings, including Chandler Lake, for the use and benefit of all Americans. In return, the Department of the Interior was obligated to convey to ASRC 92,000 acres of subsurface rights underlying the surface of lands owned by Kaktovik Inupiat Corporation (KIC), the village corporation formed under ANCSA for Inupiat Eskimos of Kaktovik.

ASRC sought title to the Kaktovik subsurface because these lands are part of the most promising and prospective area for commercial oil and gas development in the United States today. As a regional corporation established under ANCSA and under State corporate law, one of the primary legal obligations of ASRC and its management is to maximize economic benefits to its shareholders. On the North Slope of Alaska, the primary economic resource is, of course, oil and gas.

It is ASRC's considered view that its subsurface estate in ANWR is highly prospective for oil and gas, as is the adjacent 1.5 million acre Coastal Plain. This view is shared by the State of Alaska, by the oil industry, by geologists, by knowledgeable observers and by the United States Geological Survey (USGS). In 1980, prior to the development of seismic and other geophysical data and information on the Coastal Plain, USGS estimated that there was a 5 percent probability that the Coastal Plain could contain up to 17 billion barrels of crude oil and 34 trillion cubic feet of natural gas as undiscovered in-place. USGS also estimated that there was a mean probability that the Coastal Plain could contain up to 4.85 billion barrels of crude oil and 12 trillion cubic feet of natural gas undiscovered in-place.

ASRC's lands in the Kaktovik area represent our shareholders' best chance — perhaps their last significant chance — to participate in a meaningful way in the oil and gas development now occurring on the Inupiat Eskimo's ancestral lands. ASRC has proceeded, in recent months and years, toward the development of these lands. For example, in 1984, ASRC contracted for the drilling of a test well. Drilling operations were finally completed in April of 1986. ASRC and its contractors and consultants believe that the Kaktovik properties and the Coastal Plain should, as a matter of national policy, be opened by the Congress to further exploration and to development. This should be done under strict, but balanced, environmental regulations in which the Inupiat Eskimo people are afforded adequate opportunity for input.

In addition to these direct economic interests in ANWR, the Inupiat Eskimo residents of Kaktovik and many other Native people use ANWR and Coastal Plain lands extensively for maintaining their culture and their traditional life style, for a variety of subsistence uses and for many other purposes.

Purpose of This Document

Because of the many important interests that ASRC's more than 3,700 shareholders have in ANWR and the Coastal Plain, ASRC has had this report on ANWR prepared to provide Congress and the public with a balanced and fair appraisal of the modern history of the Inupiat Eskimo people who live in ANWR, together with detailed information on ANWR's environment, its fish and wildlife resources, and its oil and gas potential. The final section of the report reviews what is known about the interaction of oil industry development activities in the Arctic environment and what could be expected if such activities are permitted by the Congress to take place on ASRC's lands and on the Coastal Plain.

It is ASRC's hope that this report will set the tone for a balanced national debate — founded on factual information and practical experience — on the future management regime which should govern ASRC's lands and the Coastal Plain. ASRC's shareholders, the historic residents on the North Slope and ANWR, believe that, with proper regulation and enforcement, ANWR's potentially huge crude oil resources can be explored for and produced in ways that are compatible with the environment and the important fish and wildlife resources on ASRC's lands and in the Coastal Plain.

ASRC has commissioned the preparation of this report in advance of the national debate on the Secretary of the Interior's Section 1002(h) report. We did so in the hope that this report will assist the Administration, members of Congress, and the public to make informed judgments, based on relevant factual information, which will serve the national interest. ASRC believes that its shareholders' interests in ANWR's future designation and disposition — cultural, subsistence, and legal property interests — should be prominently considered when this matter is taken up by the Congress.

The Inupiat Eskimo people are subsistence hunters and users of the North Slope's fish and wildlife resources. Our people have carefully observed Prudhoe Bay's development over the past eighteen years. It is our judgment that we can have balanced and carefully regulated oil development on our lands in ANWR and in the Coastal Plain which will preserve the environment and the wildlife resources of ANWR and still benefit our people and the Nation. ✗

Jacob Adams

Jacob Adams, President
Arctic Slope Regional Corporation
June 1986

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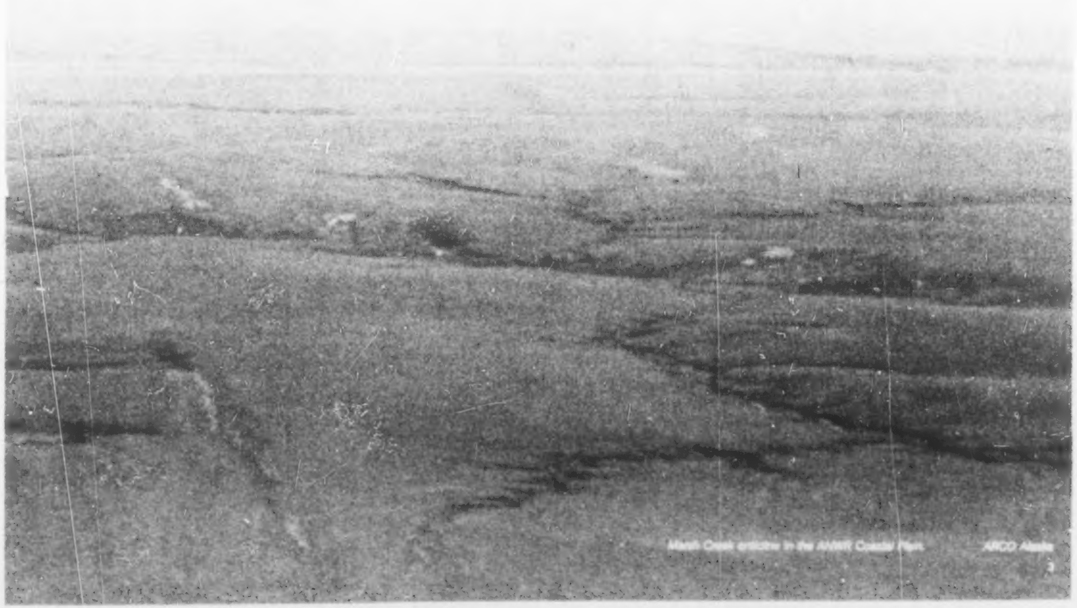
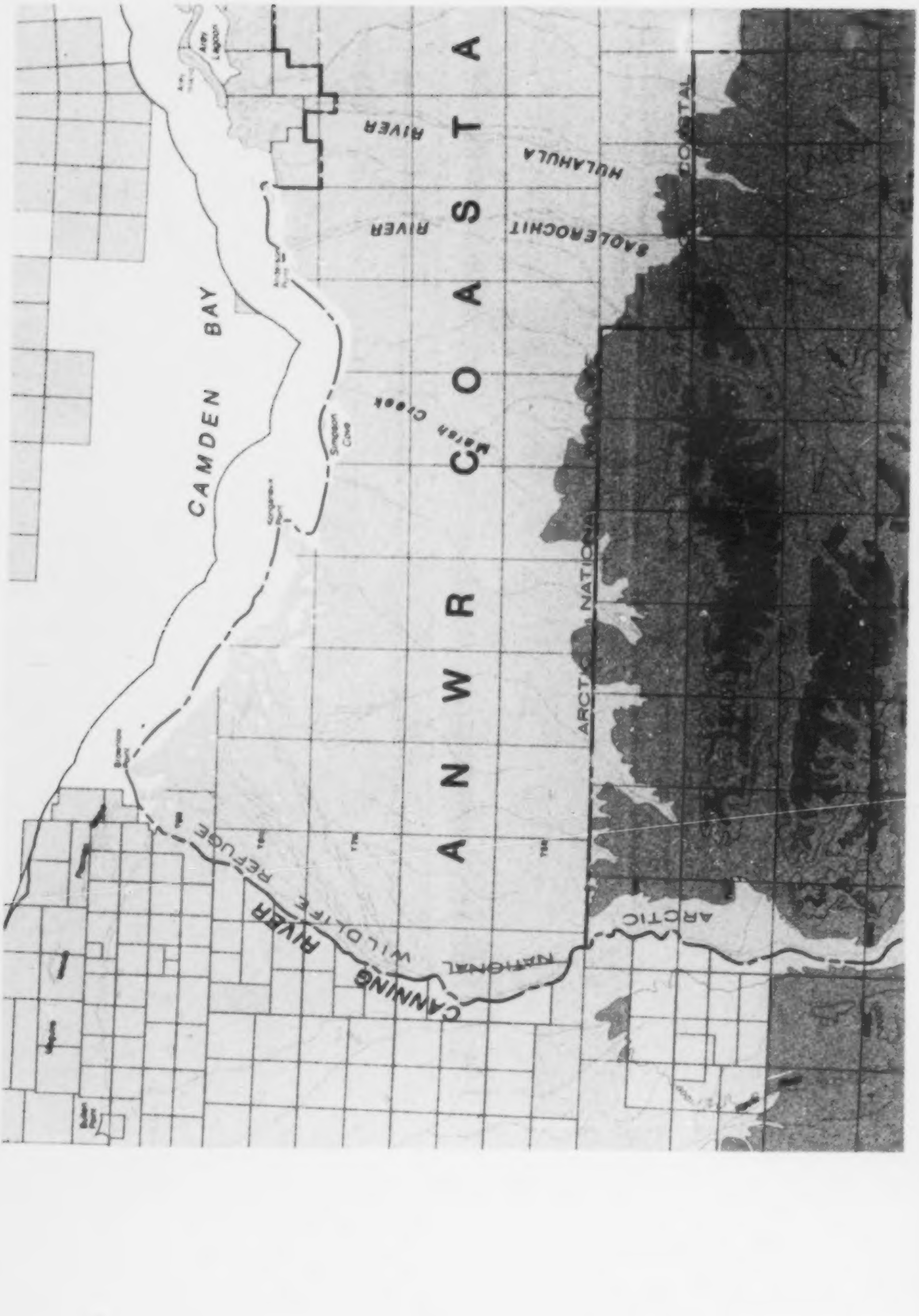


Marsh Creek anticline in the ANWR Coastal Plain.

ARCO Alaska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CANNING RIVER
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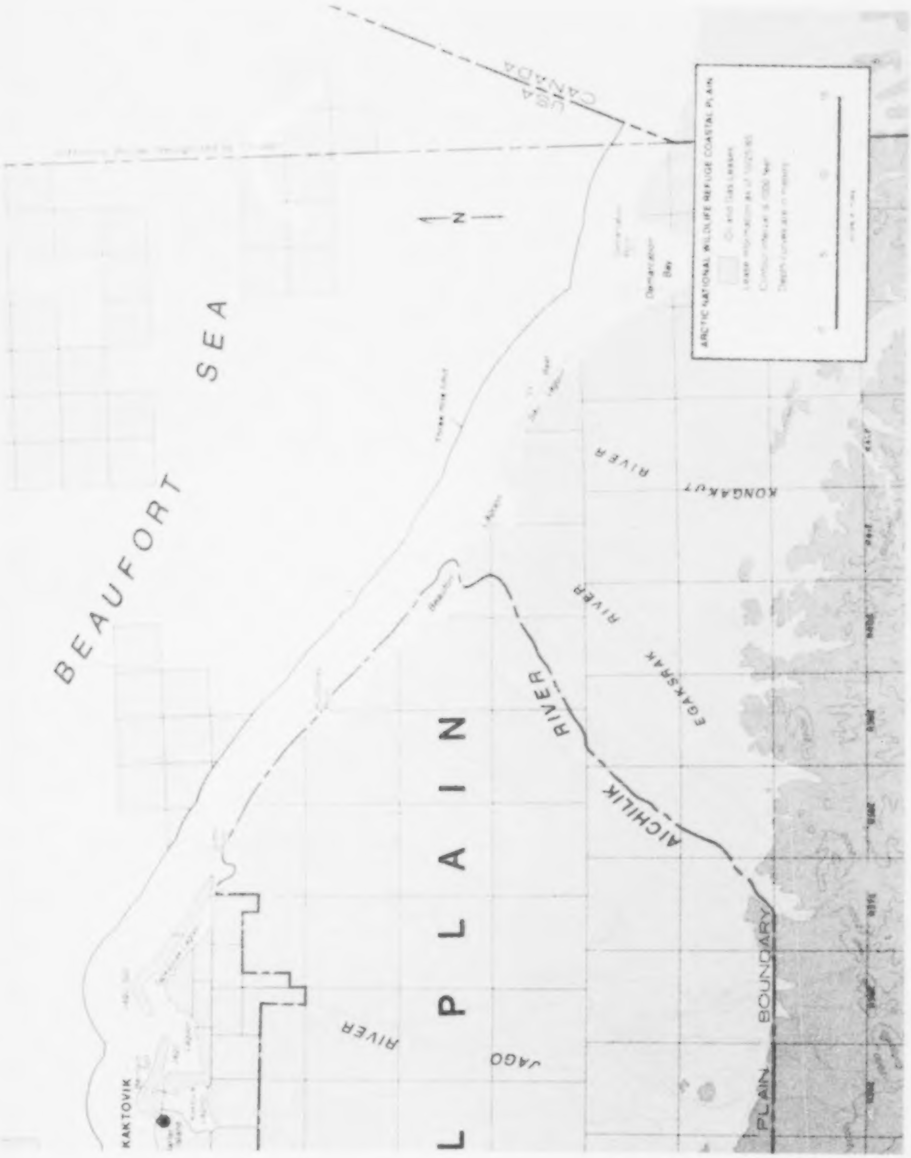
COASTAL
HULAHULA RIVER
SADLEROCHIT RIVER
Marsh Creek
Simpson Cove
Arey Lagoon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EGAKSRAK RIVER
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Grave marker in the Coastal Plain.

USFWS

Wolf track remains after loose snow is blown away.

the Refuge. However, Congress will soon reconsider the issue in one of the most important land use decisions in U.S. history.

Congress recognized both renewable and nonrenewable resources in ANWR when it passed the Alaska National Interest Lands Conservation Act of 1980 (ANILCA). In dealing with ANWR, Section 1002 of the Act specified that about 1.5 million acres of the Coastal Plain (about 8 percent of the 19 million acre refuge) should be subject to a thorough resource evaluation. About half the refuge or approximately 8 million acres was set aside by ANILCA as wilderness and is not subject to the resource evaluation. Recognizing the high potential for oil and gas deposits along with important fish and wildlife resources, Congress required a comprehensive and continuing inventory and assessment of the biologic resources of the Coastal Plain and an analysis of the potential impacts of oil and gas exploration, development and production. ANILCA also allowed limited geologic and geophysical surveys to provide a better understanding of ANWR's oil and gas potential. Under the terms of the Act, the U. S. Fish and Wildlife Service was given the mandate to conduct the assessment; a report on the findings is to be submitted to Congress by September 1986.

While ANILCA required special evaluations in the ANWR Coastal Plain before oil and gas leasing could be carried out, it is important to note that similar activities have been permitted in other refuges as a matter of course. Fish and Wildlife Service refuge management regulations allow for oil and gas extraction if it is considered to be in the national interest and is compatible with the purposes for which a refuge was established. One example of oil and gas development within a refuge is the Swanson River Field within the Kenai National Wildlife Refuge (formerly the Kenai National Moose Range) where oil has been produced for more than twenty-five years without significant adverse environmental effects.

The decisions to be made about opening the ANWR Coastal Plain to exploratory drilling and potential petroleum development will be controversial. The purpose of this booklet is to provide an overview of the environment of ANWR, its history, and its petroleum potential.

Land Management Legislation Affecting ANWR

Disposition of Federal lands in Alaska has been the subject of intense debate since the 1950s. In 1959, the Alaska Statehood Act granted title to approximately 28 percent of Alaska's land mass (about 104 million acres) to the new state, to be selected over a period of years. The following year (1960), the Arctic National Wildlife Range was established for the purpose of preserving unique wildlife, wilderness, and recreational values while at the same time allowing for oil and gas leasing; the initial withdrawal involved approximately 8.9 million acres. The same land order opened the region between the Colville and Canning Rivers to selection under the Statehood Act and to homesteading. The State of Alaska selected considerable acreage in the region, including the lands where the Prudhoe Bay and Kuparuk oil fields were later discovered. Land transfers ceased, however, when the Secretary of the Interior issued a land freeze in 1967, blocking further State selections until Native land claims were settled four years later.

During the eight years between passage of the Alaska Statehood Act and the Department of the Interior's 1967 land freeze, title to approximately 12 million acres of public land was transferred to the State. Further land transfers within the state remained "frozen" until 1971 when Congress passed the Alaska Native Claims Settlement Act (ANCSA). Granting to

King Eider.

Alaska Natives land selection rights to over 40 million acres, ANCSA paved the way for construction of the Trans-Alaska Pipeline and allowed State selections to resume. Section 17(d)(2) of the Act, popularly known as "D-2", authorized the Secretary of the Interior to withdraw up to 80 million acres of land for inclusion in national parks, wildlife refuges, forests, and wild and scenic rivers.

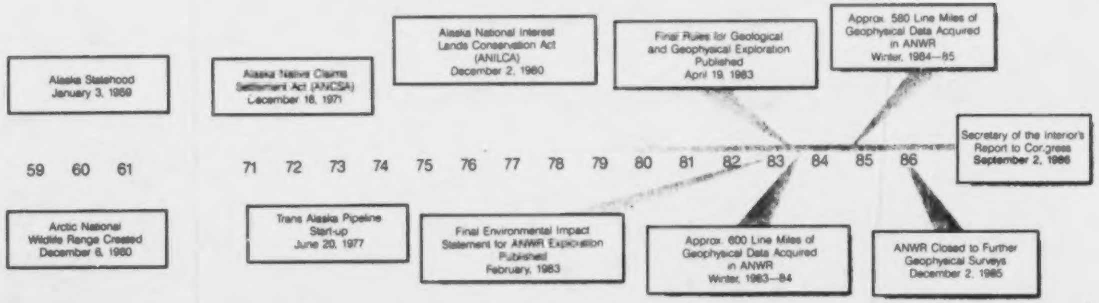
Although ANCSA opened Alaskan lands to State and Native selections for a brief time, a series of freezes were imposed on Federal land transfers until the D-2 withdrawals were accomplished. Following intense debate regarding management of Federal lands in Alaska, Congress passed the Alaska National Interest Lands Conservation Act (ANILCA) on December 2, 1980, ending an era of uncertainty. ANILCA changed ANWR's name to the Arctic National Wildlife Refuge and added about 9 million acres to double the size of the Refuge to approximately 19 million acres.

ANILCA reiterated the purposes for which ANWR was established including conservation of fish and wildlife populations and their habitats, fulfillment of international treaty obligations relating to migratory wildlife, continuation of subsistence uses by local residents, and maintenance of water quality. Congress required [in Sec. 304(a)] that administration of the Refuge be in accordance with laws governing the National Wildlife Refuge System and required [in Sec. 304(g)] preparation of a comprehensive conservation plan for ANWR. The Coastal Plain was specifically addressed in Sec. 1002 which required the Secretary of the Interior to report to Congress on the following issues:

- identification by means other than drilling exploratory wells of the oil and gas potential of the ANWR Coastal Plain
- description of fish and wildlife, their habitats, and other resources within areas having oil and gas potential
- evaluation of adverse effects of further oil and gas exploration and production on wildlife and their habitats
- identification of transportation systems for oil and gas development
- evaluation of the national need for development of ANWR oil and gas resources
- recommendations with respect to whether further exploration for, and the development and production of, oil and gas within the Coastal Plain should be permitted and, if so, what legal authority is necessary to ensure that the effects of these activities on wildlife and other resources are avoided

Geophysical surveys authorized under Section 1002 of ANILCA had to be completed before December 2, 1985, five years after the law passed. From that time, the Secretary of the Interior had nine months (until September 2, 1986) to complete his report. Pending litigation may delay submission of the report to early 1987. Until Congress takes action, no production of oil and gas from ANWR is allowed, and no leasing or development leading to production shall take place.

IMPORTANT DATES IN ANWR LEGISLATIVE HISTORY


Alaska Statehood
January 3, 1959
Alaska Native Claims Settlement Act (ANCSA)
December 18, 1971
Alaska National Interest Lands Conservation Act (ANILCA)
December 2, 1980
Final Rules for Geological and Geophysical Exploration Published
April 19, 1983
Approx. 580 Line Miles of Geophysical Data Acquired in ANWR
Winter, 1984—85
Secretary of the Interior's Report to Congress
September 2, 1986
59
60
61
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84
85
86
Arctic National Wildlife Range Created
December 6, 1960
Trans Alaska Pipeline Start-up
June 20, 1977
Final Environmental Impact Statement for ANWR Exploration Published
February, 1983
Approx. 600 Line Miles of Geophysical Data Acquired in ANWR
Winter, 1983—84
ANWR Closed to Further Geophysical Surveys
December 2, 1985

Forty Years of Oil and Gas Activity in the Arctic

The high potential for significant discoveries of oil and gas in ANWR has long been recognized. Early explorers of the region, such as Leffingwell at the turn of the century, found oil seeps and oil-stained sands. However, since ANWR was established in 1960, exploration in the region has been restricted to surface geological investigations, aeromagnetic surveys, and two winter seismic surveys (in 1983-84 and 1984-85) conducted as part of the ANILCA-permitted evaluation of oil and gas potential. No exploratory drilling has been accomplished in the area except for one well commenced in the winter of 1984-85 on Kaktovik Inupiat Corporation and Arctic Slope Regional Corporation lands southeast of Kaktovik, just outside the ANWR Coastal Plain. In contrast, nearly 250 onshore exploration wells have been drilled elsewhere on the North Slope, with another 44 drilled offshore in the Beaufort Sea. This exploration effort west of ANWR has resulted in discovery of the largest oil field in North America along with several other discoveries of significance.

Oil and gas exploration in the Arctic began in earnest in 1944 in the Naval Petroleum Reserve No. 4 (now National Petroleum Reserve-Alaska, NPR-A), which lies in northwestern Alaska, under a program conducted by the Navy. As a result of those drilling efforts (a total of 36 wells), several small, sub-economic oil and gas fields were discovered. There was a hiatus in exploration from 1953 until 1974, when the Navy resumed exploration. The program was subsequently transferred to the Department of the Interior in 1977, and by 1980, 24 additional wells had been drilled in NPR-A. The first NPR-A lease sale was held in 1982, but to date there have been no significant discoveries.

Outside NPR-A, the pattern of petroleum exploration and development on the North Slope (and more recently in the Beaufort Sea) has been influenced more by the availability of land (and its antithesis — land freezes) than geologic potential. The picture of petroleum development in the mid-1980s shows

Production well pad with drilling rig at Prudhoe Bay

Standard Alaska

Drilling rig at Topagoruk in NPR-A, 1951. USGS

Trans-Alaska Pipeline near Pump Station Number Two. Alyeska Pipeline Service Co.

major producing fields, yet to be produced fields and significant discoveries west of ANWR (both onshore and offshore) and major discoveries in the Canadian Beaufort Sea and Mackenzie Delta area to the east. These occur in similar geologic trends and sedimentary deposits to those that lie beneath ANWR.

Exploration by oil companies on Federal and State lands east of the Colville River in the 1960s culminated in the discovery in 1968 of the Prudhoe Bay oil field, the largest in North America, with original producible reserves of 9.6 billion barrels. Production, however, was delayed until concerns regarding Native land claims and the potential environmental impacts of the proposed Trans-Alaska Pipeline could be resolved. Pipeline construction started in 1974 and Prudhoe Bay production began in 1977. The adjacent Kuparuk field (with reserves of over one billion barrels) came on line in 1982, followed by the smaller Milne Point field in 1985. Together these fields are producing about 1.7 million barrels of oil per day, or approximately 20 percent of U.S. domestic production. Prudhoe Bay production will decline, however, in the late 1980s and no more new oil fields have yet been discovered with sufficient resources to compensate for that decline.

Exploration offshore in the Beaufort Sea began in the mid-1970s on State leases in shallow water. In 1978, the Endicott field was discovered near the Sagavanirktok River Delta and construction of production facilities began in 1985. The field, with estimated recoverable reserves of 350-400 million barrels, is scheduled to begin production in 1987, nine years after its discovery.

The pace of offshore exploration accelerated following the Joint State-Federal Lease Sale BF in 1979. Subsequently, there have been two additional Federal sales in the Beaufort Sea — Sale 71 in 1982 and Sale 87 in 1984. Two discoveries have been announced in Sale 71 and exploration in the Sale 87 area, which includes highly prospective tracts offshore of ANWR, began in the summer of 1985. State lease sales within the three-mile limit along the seaward boundary of ANWR have been scheduled in the Camden Bay area in May 1987, and near Demarcation Point in May 1988.

Important Geologic Features of ANWR

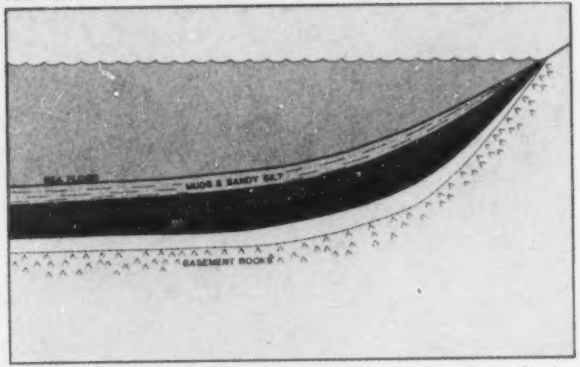
The coastal plain of the Arctic National Wildlife Refuge is generally regarded as the most prospective region for major oil fields which still remains unexplored in the United States. In addition to having favorable geology, ANWR lies between areas where significant discoveries have already been made. On the western border of ANWR a number of wells have discovered gas and condensate indicating a large accumulation in the Pt. Thomson area. To the east, in the Mackenzie Delta, over 7 trillion cubic feet of natural gas have been discovered along with several large oil fields. Also to the east, in the Canadian Beaufort Sea, major oil discoveries have been made, and the recently announced discovery at the Amauligak I-65 well probably represents a commercially producible field. The Alaskan oil and gas fields are located along geologic trends that extend through the coastal plain of ANWR and which exhibit similar geological characteristics to the older rocks of the Prudhoe Bay/Endicott fields in the west, and to the younger rocks of the Pt. Thomson area. Such favorable regional comparisons go a long way towards explaining the optimistic assessments of the oil potential of ANWR.

Potential [illegible] rock formations have been exposed in the Sadlerochit Mountains south of the Coastal Plain.

The principal geologic ingredients necessary for the formation of large oil and gas fields are believed to exist in ANWR. These include:

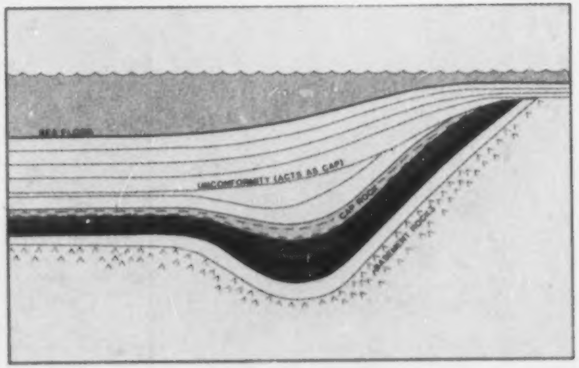
1. Source rocks, formed in part from organic materials of decaying animal and vegetable matter, that when buried and subject to high temperatures and pressures, form petroleum;
2. thick sequences of reservoir rocks such as sandstones and limestones in which petroleum can move and accumulate;
3. large geologic structures (traps) in which petroleum can accumulate, with an accompanying adequate seal (cap rock) to prevent its escape; and
4. a favorable geologic history involving a sequence of events that allowed oil and gas to form, migrate, accumulate and be trapped, without escaping to the surface.

SEDIMENTARY BASIN DEPOSITS



Deposition of sediments in ocean basins forming parent materials for reservoir and source rocks.

FORMATION OF SOURCE ROCK, RESERVOIR ROCK AND CAP ROCK



Burial and compaction of sediments in subsiding basins converts sediments to rock and organic materials to oil and gas under high pressures and temperatures. Impermeable rock above reservoir rock forms a cap which traps oil and gas.

The sedimentary rocks in ANWR include both highly organic source rocks, such as the "Pebble Shale", which is probably the principal source of Prudhoe Bay oil and gas, and thick sequences of reservoir rocks which are already established as reservoirs to major hydrocarbon accumulations in fields immediately to the west of the Refuge. Major geologic structures for trapping oil and gas exist in ANWR including several large anticlines. The most well known of these is the 40-mile long Marsh Creek anticline which trends west-southwest of Barter Island.

There are also numerous oil seeps on the coastal plain of ANWR which confirm the presence of oil producing formations at depth indicating that oil has been generated in the region and that it has migrated. However, it is not known whether it has been trapped and accumulated into a giant oil field. Only exploratory drilling will confirm that.

SEDIMENTARY ROCK SEQUENCES IN ANWR
(Stratigraphic Column)

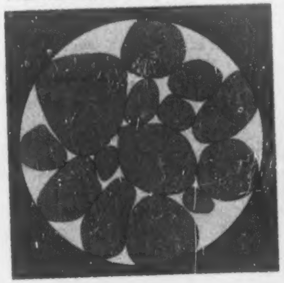
Sequence	Geologic Age	Millions Years	Formation	Known Fossil Fuels¹	
				Oil	Gas
Brookian	Tertiary	63	Sagavanirktok Formation	●	●
	Cretaceous (upper)	32.5	Colville Group	●	●
	Cretaceous (lower)	46.5	Nanushuk Group		
Ellesmerian			Kongakut Formation — "Pebble Shale"		
	Jurassic	69	Kuparuk River Sandstone Kingak Shale	●	●
	Triassic	35	Shublik Formation — Karen Creek Sandstone	●	●
	Permian	38	Sadlerochit Group	●	●
	Pennsylvanian	34	Lisburne Group	●	●
	Mississippian	40	Endicott Group	●	●
Franklinian	Devonian and Older		Sediments and Metasediments, Volcanics and Metavolcanics		

Notes: 1 Discoveries outside ANWR

Unconformities (major erosion events)

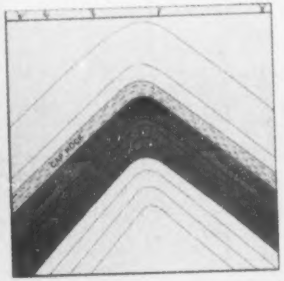
Source: U.S. Geological Survey Open File Report No. 78-489

A SANDSTONE RESERVOIR ROCK



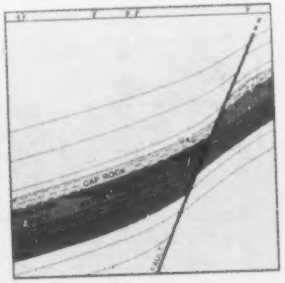
Oil occurs in the porous voids in sandstone reservoir rocks. During production, oil flows through the channels between rock grains to the well bore.

ANTICLINAL TRAP



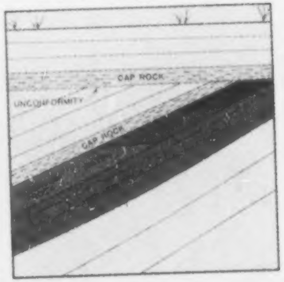
Oil and gas migrate and are trapped in an upward fold of the rock strata. In the trap, lighter gas moves to the top, underlain by oil, with water occurring beneath.

FAULT TRAP



Fracture and shifting of rock strata places impermeable rock adjacent to reservoir rock, trapping hydrocarbons. Also, fault gouge materials form a barrier to migrating oil and gas.

STRATIGRAPHIC TRAP



Inclined beds of sedimentary rocks are truncated by erosion forming an "unconformity". Impermeable rocks deposited later form a cap to the reservoir.

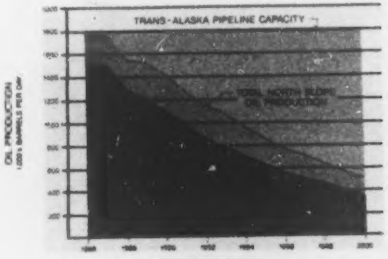
Estimates of ANWR Oil and Gas Potential

Oil industry, State, and Federal oil and gas resource estimates for ANWR have been consistently very high, indicating a potential in excess of one third of the current U. S. oil reserves and probably more than the initial reserves at Prudhoe Bay. ANWR may rank above the Beaufort Sea, central and southern California, and the deeper waters of the Gulf of Mexico, as a major potential petroleum province that could contribute significantly to the Nation's energy supplies in the 1990's when production from other areas, including Prudhoe Bay, declines.

Exploration and development of Arctic oil and gas usually takes more than ten years from the initial discovery of oil to first production. Consequently, any production from this area is not likely to occur much before the end of this century. At that time production from current U.S. reserves is expected to have declined considerably from the present level of over 8 million barrels of oil per day (bopd) to less than 3 million bopd, and Prudhoe Bay production which in 1986 is averaging 1.5 million bopd will have declined (according to the State of Alaska, Department of Revenue) to 280,000 bopd in the year 2000. To compensate for this loss of production new discoveries of domestic oil must be developed or imports must be increased.

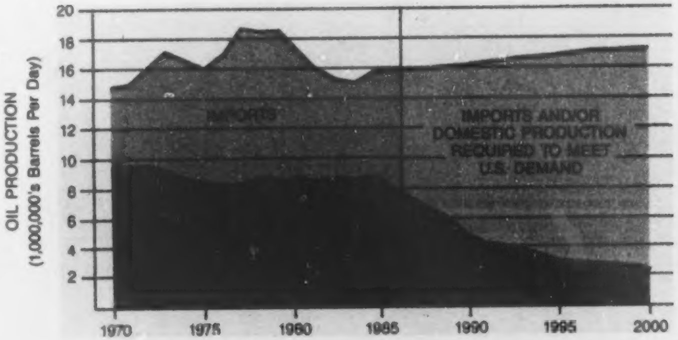
The geologic indicators are very favorable for the presence of significant oil and gas resources in ANWR, but the limited data means that there is a high level of uncertainty about how much oil and gas may be present. Consequently, current estimates represent the best scientific guesses. However, most geologists agree that the potential is on the order of billions of barrels of recoverable oil, and trillions of cubic feet of recoverable gas and that these resources may rival the initial reserves at Prudhoe Bay. Federal government estimates are currently being revised and are anticipated to be included in the ANILCA 1002 studies which are to be completed in the fall of 1986. The validity of these estimates can only be proved by drilling exploratory wells.

PRUDHOE BAY AND OTHER NORTH SLOPE OIL PRODUCTION

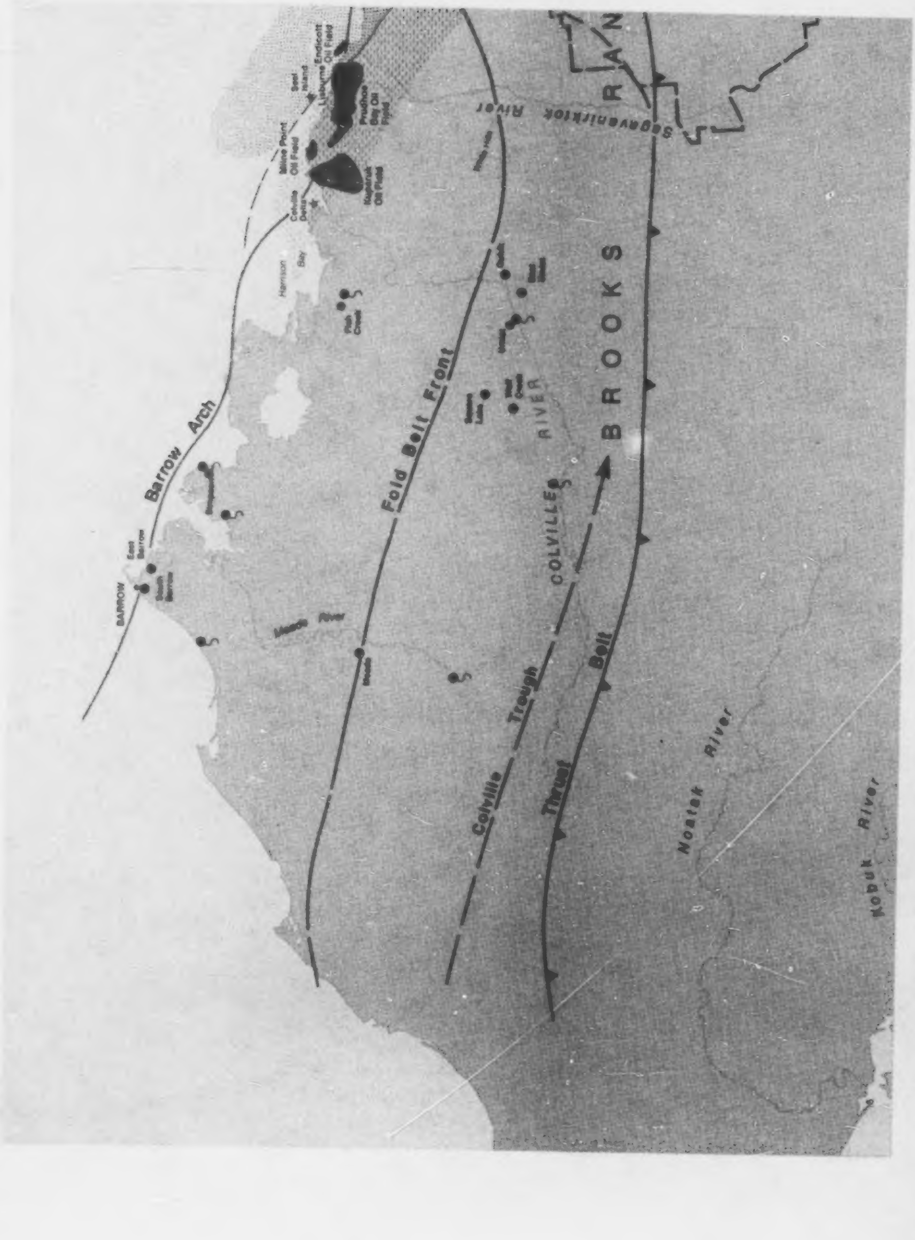


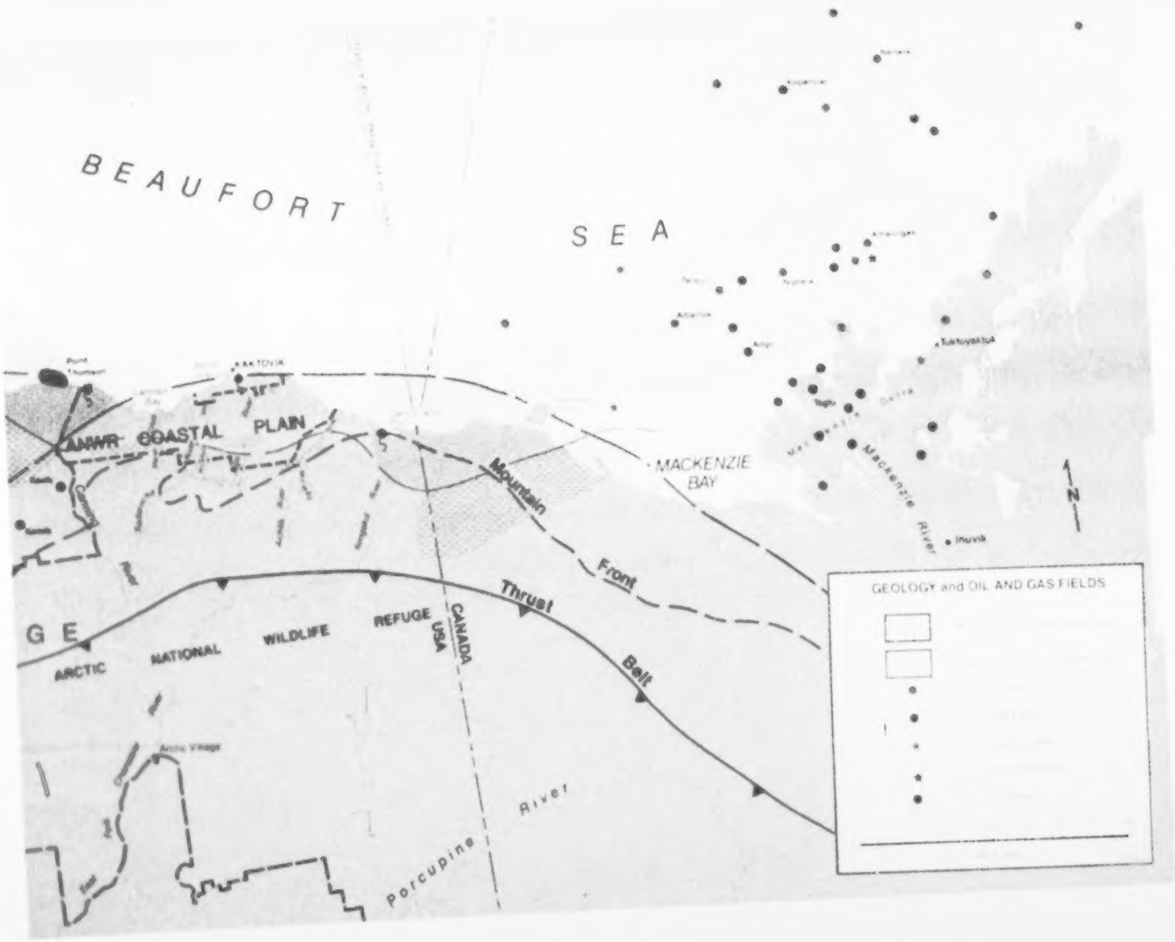
Source: Alaska Department of Revenue, March 1986

U.S. OIL SUPPLY AND DEMAND

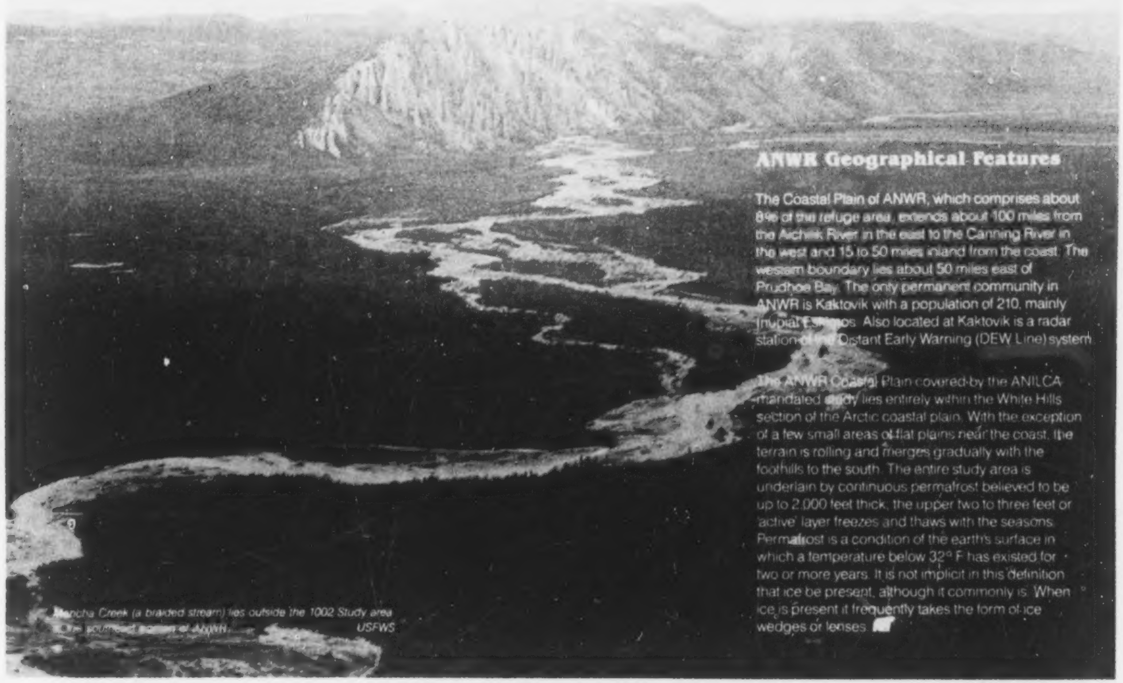


Source: Dames & Moore, 1986; Oil and Gas Journal, March 17, 1986 (adapted from Energy Information Administration)


BARROW
East Barrow
South Barrow
Barrow Arch
Meade River
Meade
Harrison Bay
Fish Creek
Colville Delta
Milne Point Oil Field
Kuparuk Oil Field
Seal Island
Lisburne
Endicott Oil Field
Prudhoe Bay Oil Field
Sagavanirktok River
Fold Belt Front
COLVILLE RIVER
Umiat
Colville Trough
Thrust Belt
BROOKS RANGE
Noatak River
Kobuk River


BEAUFORT SEA
MACKENZIE BAY
Tuktoyaktuk
Taglu
Delta
Mackenzie River
Inuvik
N
KAKTOVIK
ANWR COASTAL PLAIN
Mountain Front
Thrust Belt
CANADA
USA
ARCTIC NATIONAL WILDLIFE REFUGE
Arctic Village
Porcupine River
GEOLOGY and OIL AND GAS FIELDS

Environment of the ANWR Coastal Plain



ANWR Geographical Features

The Coastal Plain of ANWR, which comprises about 8% of the refuge area, extends about 100 miles from the Aichilik River in the east to the Canning River in the west and 15 to 50 miles inland from the coast. The western boundary lies about 50 miles east of Prudhoe Bay. The only permanent community in ANWR is Kaktovik with a population of 210, mainly Inupiat Eskimos. Also located at Kaktovik is a radar station of the Distant Early Warning (DEW Line) system.

The ANWR Coastal Plain covered by the ANILCA-mandated study lies entirely within the White Hills section of the Arctic coastal plain. With the exception of a few small areas of flat plains near the coast, the terrain is rolling and merges gradually with the foothills to the south. The entire study area is underlain by continuous permafrost believed to be up to 2,000 feet thick, the upper two to three feet or 'active' layer freezes and thaws with the seasons. Permafrost is a condition of the earth's surface in which a temperature below 32° F has existed for two or more years. It is not implicit in this definition that ice be present, although it commonly is. When ice is present it frequently takes the form of ice wedges or lenses.

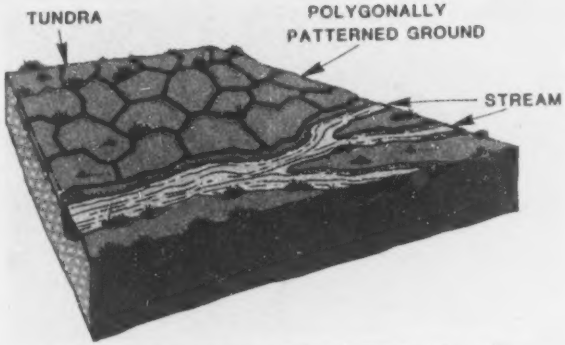
Mancha Creek (a braided stream) lies outside the 1002 Study area in the southeast portion of ANWR.
USFWS

Landforms in ANWR

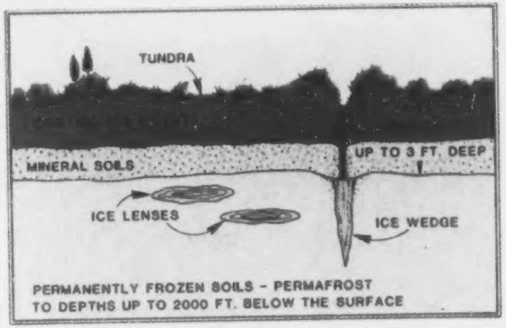
In many locations, seasonal thawing of the surface has resulted in the formation of polygonally patterned ground. The polygons develop in response to intense winter cooling and subsequent contraction of the fine-grained sediments. The thermal contraction cracks are subsequently filled by ice. The process of freezing and thawing, repeated over many centuries, results in vertical, wedge-shaped masses of ice that penetrate several feet into the soil. The result is a mosaic of polygons on the tundra, ranging up to twenty feet in diameter.

At the surface, the tundra serves to insulate the soils, limiting the depth of thaw during the summer months to no more than two or three feet in most areas. If the tundra is disturbed, deeper seasonal thawing may occur. Once the thermal balance is destroyed, it may take years to stabilize again. During that time, ponds may develop as ice wedges melt and soils subside, altering terrain, changing the vegetative cover, or in extreme cases, resulting in erosion.

Polygonally patterned ground.


TUNDRA
POLYGONALLY PATTERNED GROUND
STREAM

Ice wedges in the permafrost outline polygonal patterns on the tundra surface.

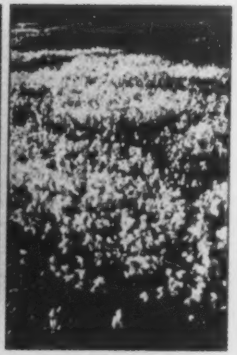

TUNDRA
MINERAL SOILS
UP TO 3 FT. DEEP
ICE LENSES
ICE WEDGE
PERMANENTLY FROZEN SOILS - PERMAFROST
TO DEPTHS UP TO 2000 FT. BELOW THE SURFACE

Cross section shows active layer and permafrost. The active layer freezes during the winter, thaws in summer. Ice lenses may occur throughout permanently frozen soils. Ice wedges develop in shrinkage cracks.

Biologists study tussock tundra in the 1002 study area. USFWS

Marsh Marigolds

Anemone or windflower



Cotton Grass W. Horstmann

Vegetation Communities in ANWR

Several tundra vegetation and landform types occur within the region, including thaw lake plains, hilly coastal plains, foothills, and flood plains.

On the tundra, microclimates which are responsible for much of the species diversity in the region are dynamic. The growth of ice wedges causes soils to be pushed upward exposing the vegetation to prevailing winds; the same process deepens the troughs between polygons. Over time, plant species at a particular site will change along with subtle changes in the microclimates.

Thaw Lake Plain. Thaw lake plains, characterized by polygonally patterned ground and shallow pond complexes, occur in less than 3 percent of the ANWR study area. The thaw lake plain extends up to 10 miles inland from the Beaufort Sea coast. This terrain type is similar to that of the main portion of the Prudhoe Bay oil field, consisting of numerous thaw lakes, drained lake basins, and expanses of low-centered ice-wedge polygons. Microtopography in this terrain type has a major influence on the distribution of plant communities.

Vegetation in drained lake basins consists of aquatic and wet tundra species including pendant grass, aquatic sedges, and cottongrass. Species commonly found in wet tundra areas are sedges, cotton grasses, a few herbaceous plants and mosses. These plant communities are considered to be particularly important for nesting birds and are heavily grazed by waterfowl prior to the fall migration. In saline soils, primary species are alkali and scurvy grasses, sedges and chickweed.

Hilly Coastal Plain. Hilly coastal plain terrain contains gently rolling topography and poorly developed ice-wedge polygons. This terrain type is found in 22 percent of the study area. Well drained sites either within the coastal plain or the rolling hills farther inland harbor vegetation which includes sedges, mosses, crustose lichens, and prostrate shrubs.

Species commonly found in these areas are several varieties of willows and herbaceous plants. On small hummocks, communities of avens and sedges occupy sites with mosses and crustose lichens.

Tussock tundra occurs frequently in the relatively well-drained soils of the hilly plain. Vegetation in these areas consists of a high percentage cover of cottongrass with dwarf or prostrate shrubs, including several varieties of willows, dwarf birch, and Labrador tea. Tussock tundra is dynamic; in these vegetation communities, older tussocks age and die. Other plant species then revegetate the site. Scientists have observed that revegetation of areas where tussocks have been damaged by vehicular traffic is similar to revegetation due to natural succession within plant communities.

Foothills. Foothills comprise about 45 percent of the study area and are characterized by hills separated by drainage channels, giving the slopes a decidedly ribbed appearance. Vegetation in the foothills is primarily sedge tussocks and dwarf shrubs. Slopes in the foothills are vegetated mainly by dwarf shrub willow, birch, and alders. The height and density of these plants varies with the amount of protection provided to the shrubs by surrounding slopes. In deep drainages where the plants are protected from scouring winds, willows may reach heights of six feet, compared to the dwarf shrubs of the coastal plain that seldom exceed several inches in height.

River Flood Plains. River flood plains, which make up about 25 percent of the study area, are typified by barren deltas and braided river channels and the terraces and alluvial deposits associated with old river channels.

The remaining area consists of alpine tundra, occurring at the southern boundary of the study area.

Climate

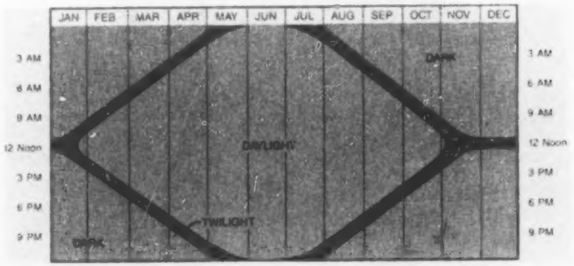
The study area demonstrates a striking contrast between summer and winter. During the summer months temperatures are relatively warm (40° F.) and daylight is continuous. During the winter months temperatures drop well below 0° F and blowing snow fills in valleys and swales, resulting in the appearance of a vast, white wasteland.

ANWR WEATHER

Average Summer Temperature (July)	41ºF (5ºC)
Maximum Summer Temperature	86ºF (30ºC)
Average Winter Temperature (Feb.)	-4ºF (-20ºC)
Total Cloud Cover	54% of year
Expected Days of Fog	115 days
Average Annual Rainfall	10 in. (25 cm)
Prevailing Winds at Barter Island	13 knots easterly

Nearly continuous winds reshape the coastal plain winter landscape

HOURS OF DAYLIGHT



Wildlife in ANWR

Caribou in the Refuge

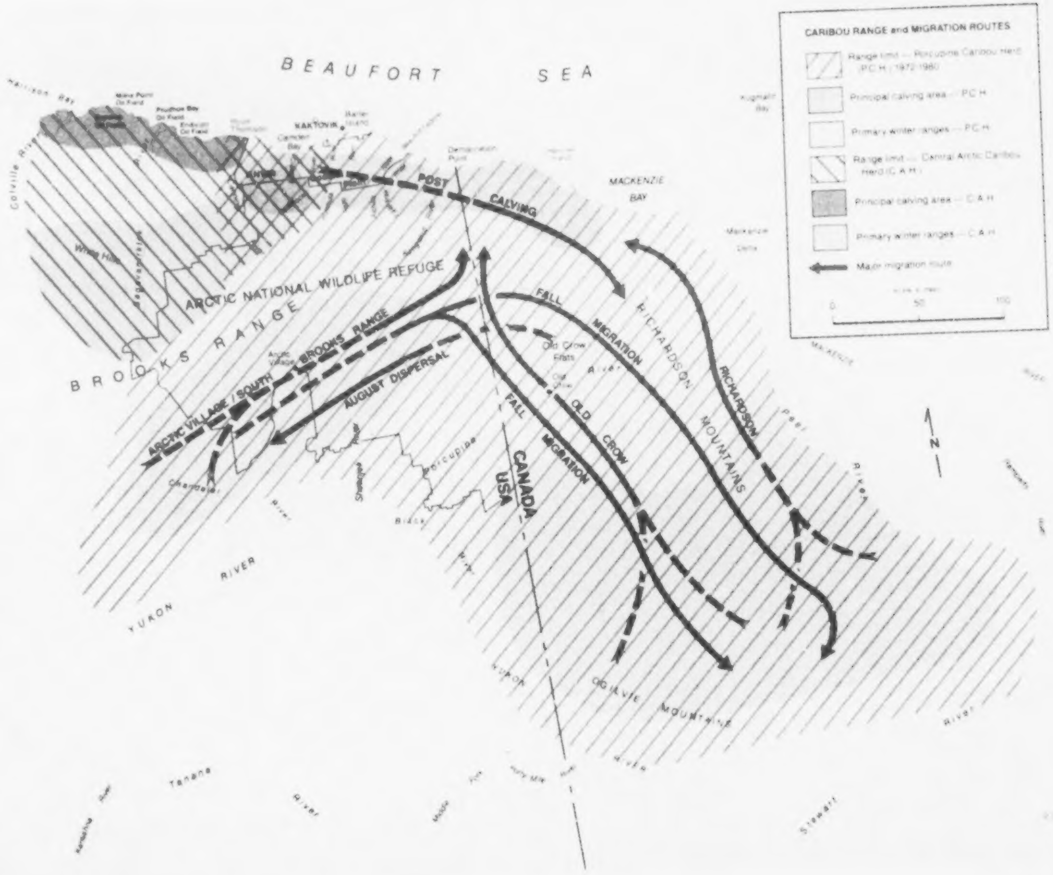
Caribou are the most numerous large mammals in ANWR. Two herds occur there: the Porcupine Herd (named after the Porcupine River) and the Central Arctic Herd. ANWR is within the main range of the Porcupine Herd, which numbers 150,000 to 170,000 animals and on the periphery of the range of the smaller Central Arctic Herd (13,000 animals). The following discussion focuses on the Porcupine Herd but basic features of the ecology and annual cycle of events are similar for both groups. During the year, caribou go through seven distinct phases of activities, some involving long migrations.

Spring Migration. The spring migration begins in early March as caribou gradually drift toward the northern limits of their wintering areas. The Porcupine Herd follows three major routes to the North Slope from primary wintering areas in Alaska and the Yukon Territories: the Richardson route through the Richardson, Barn, and British Mountains; the Old Crow route which crosses the Porcupine River near the settlement of Old Crow and continues northward through the Old Crow Flats, over the British Mountains and through the Firth River Valley; and the Arctic Village/South Brooks Range route which crosses the East Fork of the Chandalar River, the Sheenjek, and upper Coleen rivers and follows the Firth River into Canada where it joins the Old Crow route.

The caribou segregate themselves into groups which migrate at different times. Pregnant females along with some yearlings and barren cows are the first to migrate, followed by bulls and the remaining juveniles. In mid-to-late May the pregnant females arrive on the North Slope, while the others follow a few weeks later.

Calving. Calving takes place during the last week in May and first two weeks of June in the foothills and coastal plain between the Hulahula and Babbage rivers, an area that is generally snow free by early June. Caribou are not distributed evenly across the area; instead, they gather in more limited locations which vary from year to year.

Caribou herd during the post-calving aggregation (late June)


CARIBOU RANGE and MIGRATION ROUTES
▨ Range limit — Porcupine Caribou Herd (P.C.H.) 1972-1980
Principal calving area — P.C.H.
Primary winter ranges — P.C.H.
▨ Range limit — Central Arctic Caribou Herd (C.A.H.)
Principal calving area — C.A.H.
Primary winter ranges — C.A.H.
Major migration route
0
50
100
BEAUFORT SEA
Harrison Bay
Milne Point Oil Field
Prudhoe Bay Oil Field
Endicott Oil Field
Point Thomson
KAKTOVIK
Barter Island
Camden Bay
Demarcation Point
MACKENZIE BAY
Mackenzie Delta
Kugmallit Bay
Colville River
White Hills
ARCTIC NATIONAL WILDLIFE REFUGE
BROOKS RANGE
POST CALVING
FALL MIGRATION
RICHARDSON
RICHARDSON MOUNTAINS
OLD CROW
Old Crow Flats
AUGUST DISPERSAL
BROOKS RANGE
ARCTIC VILLAGE / SOUTH
Arctic Village
Chandalar
Porcupine
Black River
CANADA
USA
OGILVIE MOUNTAINS
Peel River
YUKON RIVER
Tanana River
Stewart River
N

Caribou rest as the insect harassment season begins (late June).

There is a high degree of synchrony in the timing of the births, and this synchrony is probably an adaptation to reduce predation by 'swamping' the predators — primarily grizzlies, wolves, and occasionally golden eagles. That is, for a brief period, calves are superabundant, far more numerous than the predators can kill. This allows most of the calves to develop to the stage where they are able to escape.

The calves are able to stand and nurse within an hour or two after birth, and within 24 hours they can follow their mothers and even run for short distances. The calves' precociousness is an obvious advantage where cover is sparse and predators common. Many cows with calves assemble to form small nursery bands, and these groups move slowly through the calving grounds, where the cows graze, favoring new-growth cottongrass shoots.

Post-calving Aggregation. As the mosquitoes emerge in late June and early July, the caribou gather into enormous post-calving aggregations, sometimes numbering in the tens of thousands. For example, in 1972, over 80,000 caribou assembled in one group south of Camden Bay. The caribou seek areas where breezes and cooler temperatures reduce the harassment by mosquitoes, and when there is no wind, the caribou move continually. Cold winds offer relief from the mosquitoes and permit the caribou to rest and feed freely.

During this period, the Porcupine caribou travel south and east into Canada. By mid-to-late July, most of the caribou have moved out of the Coastal Plain and into the foothills and mountains. As the mosquitoes decline, the caribou disperse, only to be plagued by two other insect pests — the warble fly and the nose-bot fly.

Dispersal. The warble fly, which looks like a small yellow and black bumble bee, lays its eggs in the fur of the legs or abdomen of the caribou. The larvae soon hatch, burrow under the skin, and travel to the back. Here they encapsulate and cut a breathing hole in the skin. Caribou commonly carry over one hundred larvae. It is not until May and June of the following year that the larvae cut exit holes, crawl out and drop to the ground to develop into mature flies.

The nose bot bears live larvae, which it deposits in the nostrils of the caribou. The bot larvae move through the nasal passages and settle down at the entrance to the throat. By spring the larvae have grown so much that they may form a mass large enough to actually interfere with breathing.

The reaction of the caribou to these flies is different from the reaction to mosquitoes. The warble and nose bot flies are strong fliers and the caribou cannot avoid them simply by seeking breezy places or moving into the wind. Instead the caribou stand, heads held low, alert for the approach of the flies. During July and early August, caribou can be seen violently shaking their heads, stamping their feet, and racing wildly over the tundra, for no apparent reason: they are seeking to evade warble or bot flies. The fly season is followed by a month's respite when the caribou can feed unmolested.

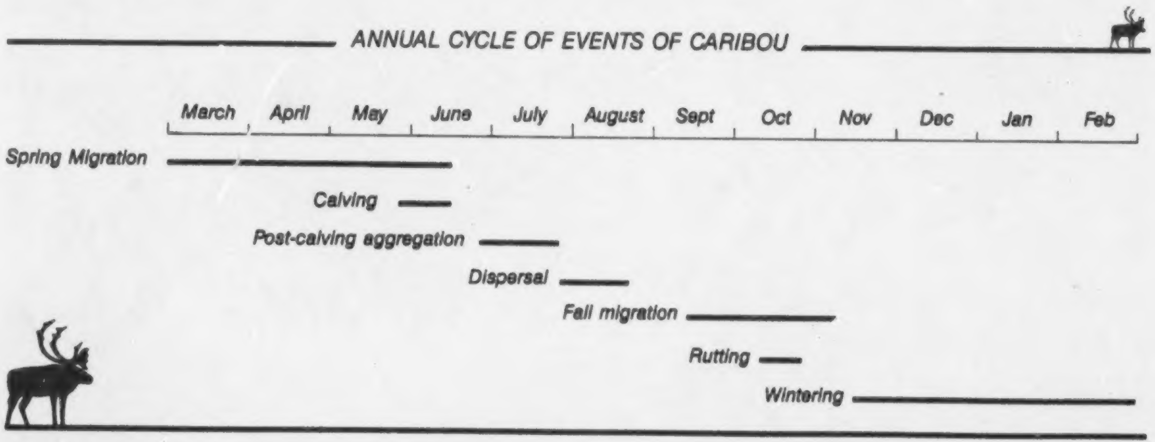
Fall Migration. The fall migration begins by the second week of September as the caribou start to move generally southward. This migration will carry the caribou one hundred to three hundred miles south into the area south of the Brooks Range, in the vicinity of Arctic Village, Alaska, and into the southern Richardson and Ogilvie mountains in the Yukon Territory. The caribou continue to lay on fat as they move south; the males will need the energy reserves for the rut and all will need it during the winter. At this time, the bulls are shedding the velvet from their antlers and rubbing them against trees and shrubs. The bulls are also becoming increasingly more aggressive, engaging in brief sparring matches.

Rutting. The rut lasts for a two-week period in mid-October. During this time the bulls fast, relying on their reserves of body fat. This brief breeding period helps to explain why the calving season is similarly brief. Even during the rut, the animals continue on to their winter ranges.

Wintering. Winter is a difficult period for the caribou. Food plants are often covered by snow, so that the caribou have to dig to gain access; nor are the food plants in the winter as nutritious or as easily digested as are those available in summer. Over the winter the animals usually lose weight.

Central Arctic Herd. The other caribou in ANWR, the Central Arctic Herd, follow the same basic pattern as that followed by the Porcupine Herd. However, in most years some individuals, several hundred to a thousand, spend the winter on the Coastal Plain within the northwestern part of ANWR.

Caribou Populations. Both the Porcupine and Central Arctic herds are biologically healthy. The Porcupine Herd has been growing steadily and is estimated to contain 150,000 to 170,000 animals. The Central Arctic Herd has been growing at a rate of 12 to 18 percent per year. It was estimated to be made up of about 3,000 animals in 1972, but now numbers over 13,000, a four-fold increase in 13 years.


ANNUAL CYCLE OF EVENTS OF CARIBOU

Grizzly Bear

Polar Bear

S. Amstrup

Other Mammals in ANWR

Grizzly Bears. Grizzly bears enter their dens sometime during the first two weeks of October and remain there until mid-April in the case of most adults or mid-May in the case of sows with new born cubs. The bears spend about half of the year avoiding the environmentally stressful winter period. Within ANWR, most dens are located on southfacing slopes in the mountains south of the Coastal Plain, where prevailing winds favor the accumulation of an insulating layer of snow. In contrast with den sites in more southerly areas, bear dens in ANWR are not surrounded by shrubby vegetation with roots that stabilize the soil. Because the soils tend to be coarse textured and poorly bonded, dens cannot be dug until the ground has frozen to a depth of about four inches. Dens in ANWR usually collapse with the spring thaw and cannot be reused in subsequent years.

Grizzlies are opportunistic feeders, feeding on carrion, vegetation, and berries, or preying on other animals such as caribou, moose, and ground squirrels. In the period immediately after the bears have emerged from their dens, they forage along river drainages. During the summer, grizzlies associate with caribou herds, feeding on carrion and preying on both adults and calves, as well as feeding on horsetail and other vegetation. During August and September, the bears return to river valleys and gradually make their way upstream to denning areas. At this time they tend to feed on berries and ground squirrels which they dig from their burrows.

In the northern areas, probably due to the short time each year when the bears are active, their growth and development are protracted over a longer period than in the more southerly areas. That is, females do not produce young until they are 6 to 12 years of age and cubs remain with their mothers for up to five years. The average litter size is 1.6 to 1.8, which is somewhat smaller than is generally found in more southerly areas. Natural mortality is generally low among grizzly bears, except for cubs. About one-half of all cubs are killed by adult male bears.

Polar Bears. Throughout most of the year, polar bears are closely associated with the ice of the Beaufort Sea offshore of the coastal plain. The sea ice is the habitat of the ringed seal, which makes up over 90 percent of the polar bear's diet. Polar bears also feed on bearded seals, which are not common in the Beaufort, and even on walrus and beluga whales. In the fall, as freeze-up proceeds, some bears move to the coast to scavenge beach-cast carrion and the remains of bowhead whales taken by whalers from Kaktovik.

Pregnant females dig their maternal dens on the mainland, on islands, or on the sea ice. In all of these locations, the bears seek areas where there is a large accumulation of drifted snow. They excavate dens during October and November, and give birth to one to three cubs in December or January. The cubs weigh little more than a pound at birth and measure about 10 inches long. By the time they emerge from the den in March or April, the cubs have grown to between 25 and 35 pounds. The sow and cubs remain close to the den for one or two weeks after emergence, during which time the cubs gain strength and become accustomed to the colder

Muskox in ANWR. *M. Robus*

Moose with calves. *D. Schmidt*

temperatures outside the den. At this point, those bears that denned on land move out onto the sea ice. The sows and cubs range over the sea ice to hunt for food. The cubs may remain with their mothers for up to 28 months.

For many years biologists believed that nearly all maternal dens were located on land. Although this may be true in certain areas, researchers have discovered that nearly 90 percent of the maternal dens in the northern Alaska region are on the sea ice.

Polar bears are protected under the terms of the Marine Mammal Protection Act. Although sport hunting is no longer permitted, hunting by Alaskan Natives is unrestricted.

Wolves. Wolves are widely distributed throughout Alaska and much of Canada. They are the largest wild members of the dog family, and adult males often weigh more than 100 pounds. They have a highly developed social structure which is manifested in the pack which is made up largely of family members. Within the pack, breeding is confined to the dominant male and the dominant female. Breeding takes place in late winter, and the pups are born during mid-May to early June, just before the time when the caribou are giving birth to their calves. The pups remain in the dens for three weeks before they begin to spend time outside, near the den. They usually remain at the den until sometime in July.

Wolves obtain most of their food by preying on large ungulates (caribou, Dall sheep, moose), particularly caribou. In some instances it is thought that wolf predation, particularly on calves, has been sufficient to cause caribou populations to decline. (Part of the explanation for the rapid growth of the Central Arctic Herd of caribou may be the virtual absence of wolves.)

Muskoxen. With their squat silhouette and shaggy pelage, muskoxen look like a relic from the Ice Age. Their habit of forming a defensive circle in the face of danger resulted in near extinction of the species by hunters with guns; the animal's instinctive defense mechanism protects them from wolves, but not from bullets. Muskoxen formerly were found throughout arctic Alaska, but they were wiped out after firearms were introduced into ANWR during the mid-1800s. In 1930, the U.S. Fish and Wildlife Service purchased 34 muskoxen from Greenland and transported them to Nunivak Island just off the west coast of Alaska in the Bering Sea. The animals prospered there in the absence of predators or competitors for forage. In 1969 and 1970, muskoxen were transplanted into ANWR. Since that time they have established themselves and the population has grown rapidly. In 1972, there were about 40 muskoxen in ANWR; in 1985 there were nearly 400, divided among three herds.

Muskoxen appear to prefer areas along rivers, where their most favored food, willows, is most abundant. They also feed on sedges and herbaceous plants.

Moose. Although moose are commonly associated with the boreal forests, they range as far north as the Beaufort Sea, making them one of the most widely distributed large mammals in Alaska. Willow is a preferred food plant, and consequently moose are most common along the major river systems where willows are abundant. However, moose are rare in the foothills and coastal plain of ANWR.

Semipalmated Sandpiper nest

Birds in the Refuge

During the brief arctic summer, the North Slope is home to millions of birds. Many come to nest and raise their young. Others come to molt or simply to pass through on migration. A few species are present year-round.

Rock and Willow Ptarmigan are the most abundant birds during winter and are found in patches of willows where they feed mainly on the buds. Ravens are the most conspicuous winter birds. A few Gyrfalcons and Snowy Owls may also be present, depending on the abundance of prey.

Late May and early June bring long days, warmer temperatures, and flocks of migrating birds — ducks, geese, shore birds, jaegers, gulls, terns, songbirds, and others. Some of these stay in ANWR, while others continue to destinations elsewhere in Alaska and Canada. Those that do stop congregate wherever bare ground or open water may be found. River deltas, flooded by meltwater, and shallow ponds are heavily used at this time, as are patches of snow-free tundra. As spring progresses, the birds disperse to occupy suitable habitats.

The migratory birds have come great distances from the far reaches of the globe. Dunlins have wintered along the coast of China, Yellow Wagtails and Northern Wheatears in southern Asia and Africa, and Arctic Terns in the Antarctic. Buff-breasted Sandpipers have come from the pampas of Argentina, Red Phalaropes from off the coast of Chile, and Tundra Swans from the Chesapeake Bay area.

Brant use the coastal plain primarily as a migration corridor, resting and feeding on vegetated mudflats while enroute to their main breeding grounds in Canada. Snow Geese feed and rest in wet sedge meadows during their migration to colonial nesting grounds on Banks Island and at the mouth of the Anderson River in Canada.

Almost immediately upon arrival, the birds begin to establish territories and attract mates. By late June most birds are on their nests and incubating eggs, and bird activity on the tundra is less evident. Part of the decline in apparent activity is due to the effort of incubating birds to be inconspicuous, but in addition, many birds actually do leave. In several species, only one parent, usually the female, incubates the eggs and cares for the chicks. For example, while female ducks incubate their eggs, the males migrate to communal molting areas. In contrast to the usual pattern, male phalaropes tend the nest and chicks while the females migrate to wintering areas soon after egg-laying.

Willow Ptarmigan

Snow Geese

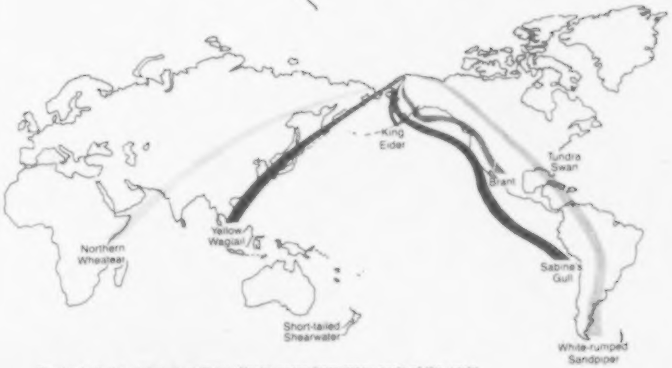
A variety of birds nest in the mosaic of habitats provided by the tundra. Red Phalarope, Northern Phalarope, Pectoral Sandpiper, Semipalmated Sandpiper, Buff-breasted Sandpiper, Dunlin, Lapland Longspur, and Savannah Sparrow are small species that nest in the area. Several species of waterfowl nest in wetlands. Tundra Swan, Canada Goose, Pintail, Oldsquaw, Common Eider, King Eider, and Spectacled Eider all are relatively common. Arctic and Red-throated loons breed on small lakes, as do Sabine's Gulls and Arctic Terns.

Most of the eggs have hatched by mid-July, and the majority of young birds are able to fly and are independent of their parents by the end of July. Waterfowl are the exception. Most young ducks and geese are unable to fly until sometime in August, although they must fledge before the onset of freeze-up.

During molt, birds shed old feathers and replace them with new ones. All birds molt at least once each year, and some two or three times. Ducks, geese, swans, and some other groups of birds loose all of their flight feathers at once, rendering them flightless and vulnerable to predators. In addition, the molt is metabolically stressful owing to the demands for growing new feathers. Thus, in advance of this molt, waterfowl move to areas where food is abundant and they are safe from predation. For example, oldsquaw move to sheltered lagoons along the Beaufort Sea coast. There they feed in the protected waters and rest on the beaches of the islands that usually are free of mammalian predators, such as foxes.

By mid-August most waterfowl are again able to fly. Some species, such as Canada Geese, Brant, and Snow Geese, congregate in coastal areas and graze on vegetation in saline and brackish meadows, laying on fat for energy to carry them south on the fall migration. In late August and early September, numerous flocks of waterfowl migrate along the coast or over the tundra. Waterfowl leave northern Alaska by several routes. Brant fly west along the Beaufort coast and then southward, ultimately ending up in Baja California. Snow Geese and Greater White-fronted Geese fly eastward to the Mackenzie River Valley and then turn southward toward destinations in the southern United States and Mexico.

By the time the tundra and Beaufort Sea freeze over and become snow covered, most of the birds have left northern Alaska and the tundra becomes quiet again until the next spring.



The birds that summer in northern Alaska come from many parts of the world

Arctic Loon on nest. D. Herter

Tundra Swans.

Red Phalarope.

People in ANWR

History

Kaktovik, located just north of the ANWR Coastal Plain on Barter Island, is the only village within the Refuge. Barter Island was an important stop for commercial whalers during the 1890s and early 1900s, but it was not until 1923 that there was a permanent settlement there. In that year, Tom Gordon established a fur trading post for the H.B. Liebes Company of San Francisco. The trading post served as an exchange point for furs and was the beginning of Kaktovik as a permanent settlement. During the years that followed, residents of the region were semi-nomadic, moving from place to place depending on the availability of fish, fur, game, and marine mammals. Today, Kaktovik has approximately 210 residents, most of whom are Inupiat Eskimos whose families have lived in the region for centuries.

Archeological investigations reveal that man has occupied the region for at least 11,000 years. Evidence of man's early presence in the area is sparse, limited to a few archeological sites near the coast. These sites contain artifacts that reflect a hunter-gatherer subsistence economy.

Contact with whalers and traders resulted in replacement of stone and bone implements with knives, axes, and other metal implements. Firearms replaced the bow and arrow and spear. By virtue of their numbers and the fact that many overwintered in the Arctic, the whalers had a profound influence on the culture. The whalers brought trade goods, including food, utensils, firearms, and alcohol, which they exchanged for caribou and sheep meat and for winter clothing manufactured from caribou hides.

Kaktovik on Barter Island.

Stefansson, who explored the region in the early 1900s, noted that although the Inupiat at first had little to do with foods brought in by whalers, they quickly learned to use flour, molasses, and other staples. These foodstuffs first were luxuries and then became necessities.

During the 1890s and early 1900s, Barter Island was a key trading point, and residents of the region came to rely on the ability to obtain trade goods there. With the cessation of whaling for bowheads, in about 1910, the Inupiat experienced the first of a series of boom and bust cycles.

In the 1890s, semi-domesticated reindeer (same species as caribou) were brought to western Alaska from Siberia in order to establish an industry that would provide a more stable economy and would insure against food shortages. In the early 1920s, under the auspices of the Alaska Reindeer Service local superintendent at Barrow, several herds of reindeer were established in the ANWR area. Herders followed their reindeer from the foothills in the winter months to grazing lands near the Beaufort Sea coast during the summer, returning each fall to the foothills. Severe winters during 1936 and 1937 resulted in loss of most of the deer to starvation. Others were killed by people for food and clothing. A Bureau of Indian Affairs survey taken during the spring of 1936 indicated that local residents were destitute and near starvation. In an effort to reestablish the reindeer herds and insure against further food shortages a herd of 3000 reindeer was driven from Barrow to the Barter Island area in late 1937. As the herd approached Barter Island it turned back toward its home range in Barrow, taking most of the remaining local reindeer with it. The people were so discouraged that they killed the few animals that remained, ending the era of reindeer herding in ANWR.

Beginning in the 1920s fur trapping was a good source of cash income, replacing caribou as a trade good. But the price of fox fur dropped in the late 1930s, and trading posts along the coast closed one by one. The post at Barter Island closed following Gordon's death in 1938. By 1943 all of the trading posts in the region had been closed and people had to go to Canada to trade. Eventually, several families moved to Canada. Hard times continued in the region until 1945 when the U.S. Coast and Geodetic Survey began mapping the Beaufort Sea coastline, bringing some wage employment.

Although World War II had little effect on the region, the installation of the Distant Early Warning (DEW Line) system on the island during the 1940s displaced many local residents. In 1947 the U. S. Air Force constructed a runway and hangar on the historic village site, forcing residents to relocate. In 1951, the entire area around Kaktovik was made a military reserve, and some people were required to move again. The village was moved once more in 1964, but this time, residents received title to their village site. Jobs resulting from government activities in the region and the subsequent establishment of a school caused the Barter Island population to increase from less than 50 people in 1950 to approximately 150 in 1953 when several families returned from Canada.

Cash and Subsistence Economies

The changes in living patterns in Kaktovik have been primarily the result of changes in the economy. Traditionally, Inupiat have had a subsistence economy, in which small bands of people harvested plants and animals for food and for raw materials. Typically, all members of the band shared in the system, and in this respect the Inupiat culture was communal. Contact with Western Civilization, however, changed the nature of the Inupiat economic system.

Four distinct waves of economic activity have passed through the region between 1890 and 1975--whaling, trapping, reindeer herding, postwar construction. More recently, oil and gas development and the North Slope Borough capital improvement program have increased economic activity. Throughout these changes, the Inupiat have retained strong ties to the land. The people have continuing links to their natural surroundings, not only to provide food and the raw materials for clothing, tools, and other items, but also to set the defining patterns of their culture—seasonally, socially, and ceremonially. Despite an ability to adopt and incorporate many elements of Western culture, technology, and economy into their lifestyle, the great majority of Inupiat still participate in subsistence activities as hunters and as sponsors and sharers of the hunt. North Slope residents have made it very clear that this is both necessary and preferred for economic, social, and cultural reasons.

For most Inupiat, life without native foods is unthinkable. Native people believe that without traditional ties to nature, the Inupiat social and economic patterns would have no basis. The use of wildlife for subsistence makes it necessary for the Natives to live in small villages. The area around larger villages may become overhunted, forcing residents to range farther and farther in search of wildlife and other subsistence resources.

Preservation of subsistence resources and access to them has been identified as a high priority of North Slope residents. A 1977 survey indicated that about eighty percent of Eskimo households on the North Slope obtained at least some of their food through personal hunting and fishing. Forty percent indicated that they got half or more of their total household food through hunting and fishing. Sharing of subsistence resources is especially important: 75 percent reported they had obtained some wild game and fish from other households. Well over 90 percent of the Inupiat residents regularly consume wild foods, regardless of their source.

Kaktovik residents use Dall sheep, caribou, fish, seals, whales, birds and eggs, moose, and furbearers. The relative importance of each resource and the intensity of hunting or gathering at particular sites varies significantly from year to year. Whaling is particularly important. Kaktovik residents hunt bowhead whales, near the village each fall, mainly during September and October.

> ***Earning and spending patterns . . . are at least in part culturally determined . . . In any society, a person will work only up to the point at which the costs of working, in terms of time given up, equal the benefits. When the costs of giving up this time begin to exceed the benefits, measured in money, the person quits working. For the Inupiat, this point is often reached earlier than in the non-Native society, because the value to them of what they could buy with that extra money is not worth giving up the extra time.***
>
> Michael J. Jacobson and Cynthia Wentworth in *Kaktovik Subsistence: Land Use Values Through Time in the Arctic National Wildlife Refuge Area.*

Base Operations Center, Western Operating Area, Prudhoe Bay Field Standard Alaska

K/C well near Kaktovik Chevron USA

Interaction of the Oil Industry and the Arctic Environment

The petroleum industry has operated in Arctic Alaska for over 40 years. Associated with its operations, there have been many research projects to study the effects of such activity on vegetation and terrain, on waterfowl and other birds, and on mammals, such as caribou. Some of this research has been funded by government agencies, but most of it has been funded by the petroleum industry and conducted by independent scientists. This research has yielded the knowledge that enables the oil industry to explore and develop petroleum resources in the Arctic with a minimum of environmental impact.

The focus of research concerning potential oil and gas development in the ANWR Coastal Plain relates to the effects of development on the area's wildlife, and the tundra vegetation and water resources that provide habitat for those animals. In particular, research has focused on the potential effects on the caribou herds that seasonally use the refuge, and tundra disturbances. To analyze these issues requires a knowledge of wildlife in ANWR and information on their interactions with oil activities elsewhere. It also requires an understanding of exploration and development activities, their timing, and the regulatory framework relating to environmental protection. Throughout all aspects of exploration in Alaska, Federal, State, and local regulatory agencies require permits that ensure adverse environmental effects are kept to minimum. These permits are needed for most petroleum operations including siting of facilities, placement of gravel, routing of temporary and permanent roads, construction of pipelines, and drilling. Such permits typically contain conditions or stipulations to protect fish, wildlife or vegetation resources.

An excellent example of oil and gas exploration in the area adjacent to the ANWR Coastal Plain has already occurred. An exploratory well was drilled in 1985-86 on Kaktovik Inupiat Corporation and Arctic Slope Regional Corporation lands about 14 miles southeast of Kaktovik. This is the only well that has been drilled between the Canning River and the Canadian border north of the Brooks Range. Construction and drilling operations were conducted in close coordination with U. S. Fish and Wildlife Service and included construction of an ice road and ice airstrip and a 5-acre drilling pad. Wildlife in the area were not affected by the operations. Construction of the ice road and airstrip began in December of 1984, the well was spudded in mid-February 1985 and drilling operations were suspended in early May of that year. The road and airstrip were reconstructed in late November of 1985 and drilling resumed. Drilling operations in the well were completed in April of 1986; timbers and foam insulation used under the rig are expected to be removed during the summer of 1986.

Production facility at Prudhoe Bay

Standard Alaska

Oil and Gas Activities

In the petroleum industry, there is an orderly progression of events from leasing to exploration to development; in ANWR the progression is expected to take about 15 years or more. These long lead times result from the remoteness of the region, concerns for protection of the environment, and the regulatory requirements. The long lead time also means that in order to evaluate fully the ANWR Coastal Plain's petroleum resources so they might compensate (before the year 2000) for the imminent decline in domestic petroleum production, exploration must begin as soon as possible.

Oil field activities fall into three phases: exploration, development, and production. The intensity of activity and the level of potential impacts to the environment are significantly different from phase to phase.

Exploratory Operations. Exploration includes surface investigations by geological field crews, geophysical (seismic) surveys, and exploratory drilling. Planning and permitting for an onshore North Slope exploration well, which is typically drilled during the winter, can take three to six months. Drilling time varies depending upon the depth of the well and other factors. The work may be accomplished without construction of permanent facilities. Roads and airstrips may be built of ice which will melt out by mid-summer.

Development. Once additional drilling confirms a commercial discovery, detailed engineering, economic, and environmental studies commence. During this time, a proposed project undergoes a thorough regulatory review which usually includes preparation of an environmental impact statement. Specific permits are required for most oil field activities including placement of fill, disposal of wastes, drilling activities, emissions from construction facilities, and so on. The highest level of activity occurs during the development phase as additional wells are drilled and camp and production facilities are constructed.

Production. Oil field construction activity wanes as production starts and the emphasis shifts from construction to maintenance activities. However, development drilling activity continues throughout the life of the field for secondary and tertiary recovery.

Protecting the Permafrost and Vegetation

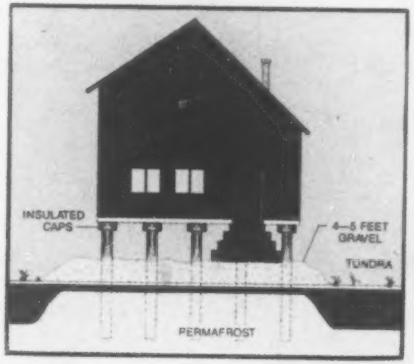
Numerous studies in Arctic Alaska have focused on tundra vegetation. This research has resulted in development of ways to conduct routine oil and gas exploration and production activities without significantly degrading the mat of tundra that insulates the permafrost. Consequently, there is now a large body of knowledge regarding tundra plant species, geomorphological processes, and the interaction of industrial activities and physical and biological dynamics in the region.

From the years of operating experience there has developed an environmental protection technology to minimize, and in some cases eliminate long-term changes to the tundra. For example, low-pressure tired vehicles have been developed which can cross the tundra without crushing the vegetative mat or scouring the soils as tracked vehicles might. Ice roads have been constructed to provide winter access to remote sites. These temporary roads provide dependable access to sites by heavy equipment; they melt during spring breakup leaving the tundra essentially as it was before the road was built.

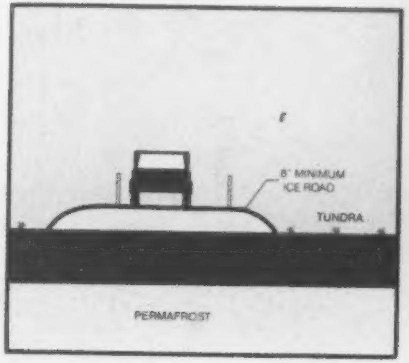
Although it is not an alternative for development, some single-season exploration drilling has been done from ice or snow pads in the Alaskan Arctic. Permanent facilities at Prudhoe Bay are constructed on gravel pads, and gravel roads have been constructed to provide access to individual production sites. Typically, 4 to 5 feet of gravel provide adequate protection of the permafrost. The gravel insulates the permafrost and provides a stable work area for drilling rigs and other facilities. In addition, heated buildings and warm oil pipelines are constructed on pilings to prevent thawing of the gravel pads and underlying soil. Continuous monitoring of these facilities and modification, when appropriate, have resulted in minimal impacts to the surrounding tundra vegetation and drainage patterns.

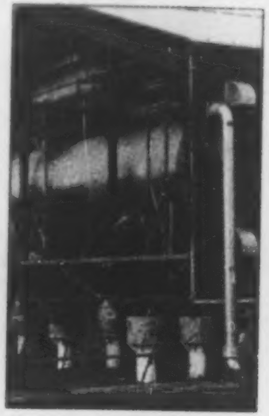
To reduce costs of development in the Arctic and to minimize effects on the environment, drilling and production technology has been developed to allow oil and gas production facilities to be concentrated into fewer locations. Within the roughly 250 square mile area of the Prudhoe Bay oil field, less than 10 square miles of land have been affected directly or indirectly by oil production facilities.

PERMAFROST PRESERVATION
GRAVEL PAD



PERMAFROST PRESERVATION
ICE ROAD





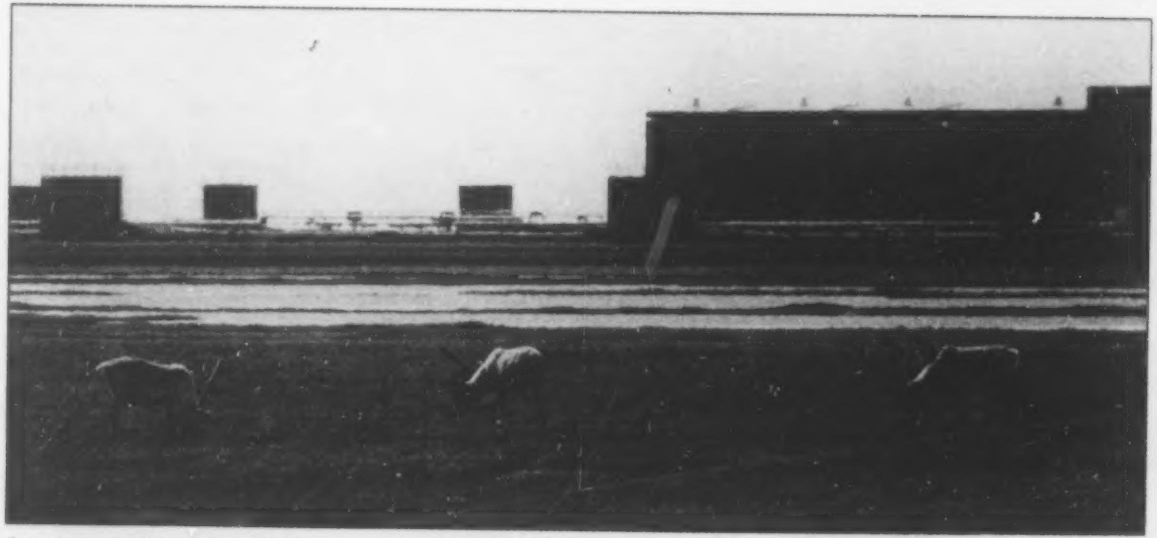
Installation of production module on pilings at Prudhoe Bay Standard Alaska

Interactions Between Caribou and Oil Development

When the Prudhoe Bay oil field was developed in the mid-1970s, regulatory agencies acted cautiously and studies were conducted to determine the effects on the Central Arctic Caribou Herd. Early on there were concerns about how the caribou, accustomed to open tundra, would be able to negotiate roadways and raised pipelines. Would the caribou be diverted from travel to important areas by the easy walking afforded by roads? Would they be frightened by vehicle traffic? Would they be afraid to walk beneath pipelines? Because of these concerns, there has been a considerable amount of research on the Central Arctic Herd, the herd whose range includes the Prudhoe Bay field.

The experience with the Central Arctic Herd is of particular interest because of its proximity to ANWR. Perhaps the most striking fact about the Central Arctic Herd is that it has increased at a rate of 12-18 percent per year over the past decade. At more than 13,000, it numbers at least four times what it did in 1975 before most of the Prudhoe Bay development activity began. The situation with the Central Arctic Herd is spectacular, but not unique. There are examples from northern Europe and the Soviet Union of reindeer (the same species as caribou) herds calving and grazing in the presence of industrial development, including oil fields and railroads. Caribou and the petroleum industry can and do [redacted]

Caribou crossing road at Kuparuk River. Alaska Biological Research



Caribou graze near production facility at Prudhoe Bay

Mosquitoes are important determinants of how often caribou encounter oil field operations. When the caribou seek relief from mosquitoes, they travel rapidly north to the coast to take advantage of onshore breezes and return inland when mosquitoes temporarily subside. This movement pattern causes the Central Arctic Herd to frequently encounter oil field structures and 80 percent of pipeline-caribou interactions occur during mosquito season. In contrast, during the fly season, the caribou cannot find relief by seeking windy locations; at this time they often ignore development activities. When warble and bot flies are bothersome, caribou actively seek out roads, gravel pads, and the shade of buildings to gain relief from the pests.

Caribou tend to follow the path of least resistance when traveling, as long as that path leads to their destination. For example, they avoid swimming through lakes in summer, but move across frozen lakes during winter. They also tend to travel along land contours and along eskers (natural gravel features similar to gravel roadways). But they will negotiate more difficult terrain when this is necessary.

Caribou may hesitate crossing under an elevated pipeline and may choose a gravel ramp over the pipeline if one is present, but they often cross beneath pipelines. It is only the combination of an elevated pipeline and an adjacent road with moving vehicles that significantly decreases crossing success, but even under these circumstances crossing by caribou is not entirely precluded.

The concept of 'critical calving areas' has been a focus of some attention. Although caribou tend to calve in the same general region each year, within that broad area the caribou calve in different locations in different years. The experience of the Central Arctic Herd, which occupies the coastal plain to the west of ANWR and includes the Prudhoe Bay, Kuparuk, and Milne Point oil fields, indicates that industry operations within the general region have not affected calving success; this conclusion is supported by the continued healthy growth of the herd's population.

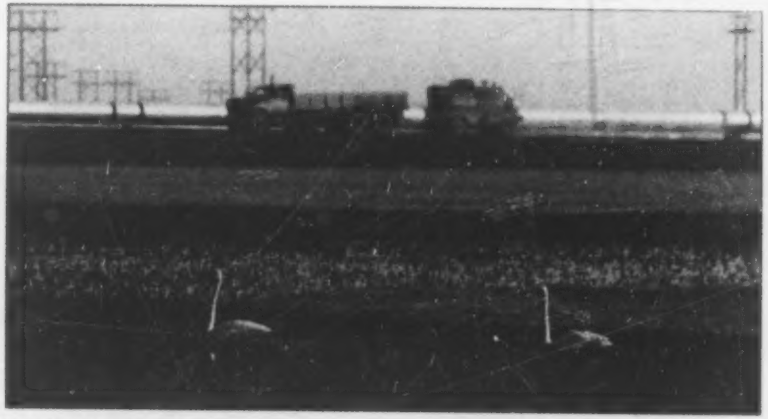
Interaction of Bears and Oil Development

Grizzly Bears. The range of the grizzly bear in North America has contracted greatly with the expansion of human settlement. However, this change was not a retreat of the bears into more remote areas, but rather the consequence of hunting by man, related particularly to protection of livestock and people. Very often garbage was mishandled, creating an attraction for bears and the potential for negative encounters. Bear problems in the past were most often solved with a rifle. In contrast, in recent years bears have come to be highly valued and emphasis has been placed on preventing bear-human encounters. Much of the current knowledge has been gained from experience in national parks.

A basic element in protecting bears and avoiding interactions is to ensure that garbage is incinerated so that bears are not attracted by odors. Most encounters occur when people are walking near bears. However, oil field workers usually restrict their activities to the roads and gravel pads where the chance of unexpectedly encountering a bear is remote. Encounters with bears in the Prudhoe Bay area have been few and none has resulted in the death of a bear.

Polar Bears. Given the fact that polar bears in many areas den on land, it was formerly believed that pregnant polar bears probably denned in significant numbers on land in northern Alaska. But the recent information that nearly 90 percent of female polar bears established their maternal dens on the sea ice greatly alleviates the fear that winter operations in ANWR (or elsewhere on the North Slope) could significantly affect the polar bear population.

Interaction of Birds and Oil Development



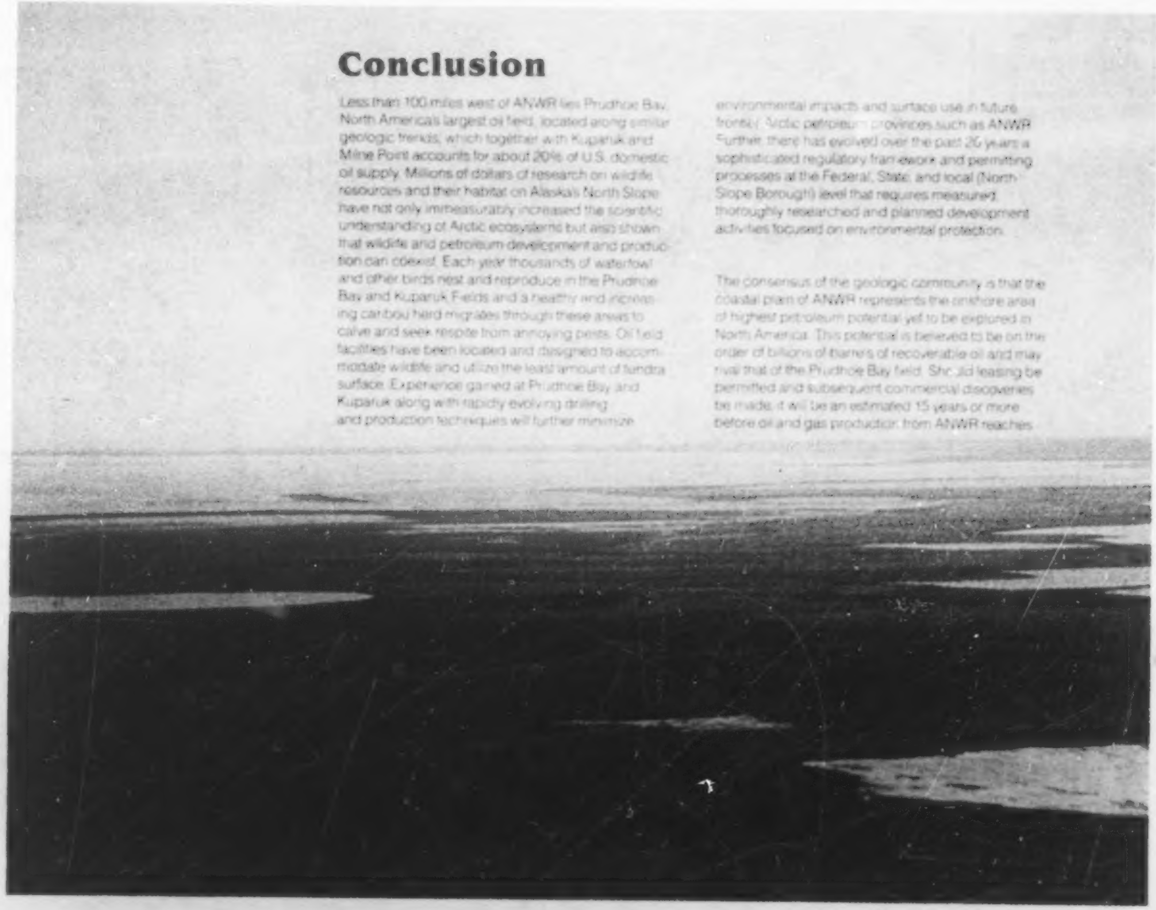
Tundra Swans in Prudhoe Bay wetlands

Birds are abundant on the North Slope, particularly during migration and the summer nesting period. Experience at Prudhoe Bay indicates that the effects of development will be small and sometimes positive.

The presence of roads has a local effect on bird habitat. Drifted snow near roads may not melt until late June or early July thereby locally limiting sites available to early-nesting species such as Lapland Longspurs and Semipalmated Sandpipers. On the other hand, dust from roads may cause earlier snowmelt, resulting in greater availability of snow-free habitat which may balance the temporary loss in drifted areas. Early in the summer season, the birds compete intensely for the limited space in the first snow-free areas. Birds that are unsuccessful at securing territories move onto the remaining habitat as the snow cover disappears delaying their nesting.

In flat, wet tundra areas such as those associated with the thaw lake plain, gravel roads may restrict drainage and create small impoundments. These impoundments provide additional habitat for species such as Northern Pintails and phalaropes but these impoundments may reduce the amount of habitat available to other species such as Lapland Longspurs, Buff-breasted Sandpiper, and King Eider. Changes in drainage patterns have been a focus of attention within the Prudhoe Bay development where there is little topographic relief. Consequently, detailed geobotanical maps classifying landforms, vegetation and drainage features have been prepared for Prudhoe Bay to provide the necessary information to locate facilities and route pipelines to avoid or minimize loss of the more valuable habitat and to avoid significant changes in drainage patterns. Changes in drainage resulting from construction of well pads are expected to be less of an engineering problem throughout most of ANWR where rolling hills result in well-defined drainage channels.

Oil field facilities, including pipelines and gravel pads, provide sheltered nooks and crannies that are used by some birds for nesting. In particular, Snow Buntings make use of new nest sites provided by pipelines and buildings.

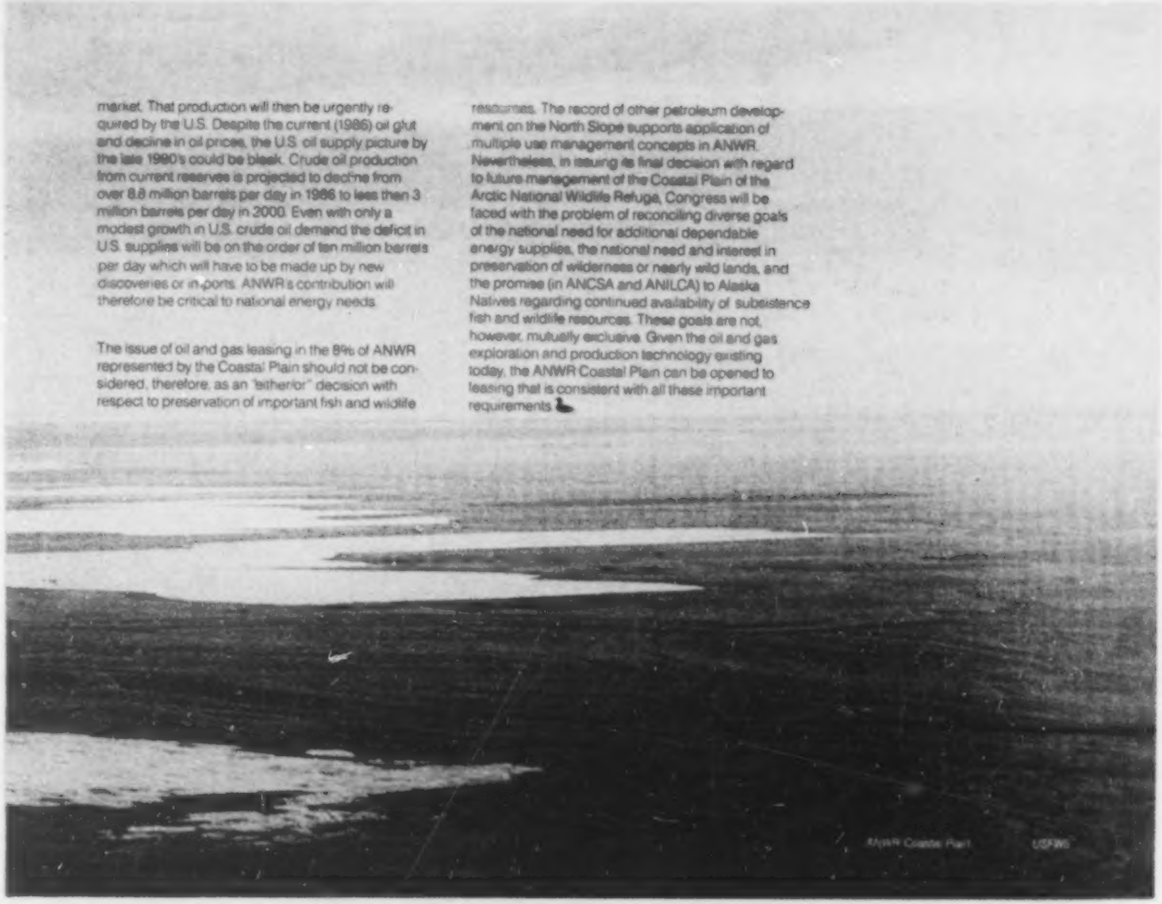


Conclusion

Less than 100 miles west of ANWR lies Prudhoe Bay, North America's largest oil field, located along similar geologic trends, which together with Kuparuk and Milne Point accounts for about 20% of U.S. domestic oil supply. Millions of dollars of research on wildlife resources and their habitat on Alaska's North Slope have not only immeasurably increased the scientific understanding of Arctic ecosystems but also shown that wildlife and petroleum development and production can coexist. Each year thousands of waterfowl and other birds nest and reproduce in the Prudhoe Bay and Kuparuk Fields and a healthy and increasing caribou herd migrates through these areas to calve and seek respite from annoying pests. Oil field facilities have been located and designed to accommodate wildlife and utilize the least amount of tundra surface. Experience gained at Prudhoe Bay and Kuparuk along with rapidly evolving drilling and production techniques will further minimize environmental impacts and surface use in future frontier Arctic petroleum provinces such as ANWR. Further, there has evolved over the past 20 years a sophisticated regulatory framework and permitting processes at the Federal, State, and local (North Slope Borough) level that requires measured, thoroughly researched and planned development activities focused on environmental protection.

The consensus of the geologic community is that the coastal plain of ANWR represents the onshore area of highest petroleum potential yet to be explored in North America. This potential is believed to be on the order of billions of barrels of recoverable oil and may rival that of the Prudhoe Bay field. Should leasing be permitted and subsequent commercial discoveries be made, it will be an estimated 15 years or more before oil and gas production from ANWR reaches market. That production will then be urgently required by the U.S. Despite the current (1986) oil glut and decline in oil prices, the U.S. oil supply picture by the late 1980's could be bleak. Crude oil production from current reserves is projected to decline from over 8.8 million barrels per day in 1986 to less than 3 million barrels per day in 2000. Even with only a modest growth in U.S. crude oil demand the deficit in U.S. supplies will be on the order of ten million barrels per day which will have to be made up by new discoveries or imports. ANWR's contribution will therefore be critical to national energy needs.

The issue of oil and gas leasing in the 8% of ANWR represented by the Coastal Plain should not be considered, therefore, as an "either/or" decision with respect to preservation of important fish and wildlife resources. The record of other petroleum development on the North Slope supports application of multiple use management concepts in ANWR. Nevertheless, in issuing its final decision with regard to future management of the Coastal Plain of the Arctic National Wildlife Refuge, Congress will be faced with the problem of reconciling diverse goals of the national need for additional dependable energy supplies, the national need and interest in preservation of wilderness or nearly wild lands, and the promise (in ANCSA and ANILCA) to Alaska Natives regarding continued availability of subsistence fish and wildlife resources. These goals are not, however, mutually exclusive. Given the oil and gas exploration and production technology existing today, the ANWR Coastal Plain can be opened to leasing that is consistent with all these important requirements.



ANWR Coastal Plain

USFWS

Senator **Wirth**. Senator Murkowski?

Senator **Murkowski**. Thank you very much, Mr. Chairman. Mr. Brower, Mr. Leavitt, I think your testimony is the most significant to the record.

I am curious to know, both of you gentlemen pursue subsistence lifestyle, hunting, whaling. Is that not correct?

Mr. **Brower**. That is right.

Senator **Murkowski**. Might I ask if you are successful in the whale hunt this year?

Mr. **Leavitt**. I do the spring hunting. He does the fall hunting. I was not successful. But prior to me was Mayor Ahmaogak, and he was successful in catching a whale.

Senator **Murkowski**. And you have the fall hunt ahead of you, so you have the opportunity yet to be successful this year.

Mr. **Brower**. That is right.

Senator **Murkowski**. Well, as the elder of the two witnesses, I think it is quite appropriate that you get the first whale, and the junior member get the second whale.

From my own background I am aware of instances where there was a concern for the migratory pattern of the bowhead whale, which moved through the Arctic waters at certain times.

And there was a concern over industry activity. It is my understanding that there were discussions between your people, your whaling captains, and the industry, and they agreed to reduce activity, or eliminate activity, at particular times when the migration was underway.

Could you indicate whether these type of agreements in your opinion are workable? Are they genuinely preceded with the best of honorable intent by both sides? It seems like you have been able to work out some of your concerns, without an awful lot of government intervention.

Mr. **Leavitt**. Senator Murkowski, to respond to your question, yes, there have been instances where the whaling captains and the borough government has worked out, particularly in the fall whaling, when the migration of the bowhead head back west.

There have been times when the industry has decreased their activity, in order for the whales to pass by. Those have been worked out with the industry and the whaling captains.

Senator **Murkowski**. Do you know if Canada has adopted any type of arrangement, in regard to limiting activity, or reducing activity during the same migratory movement?

Mr. **Leavitt**. I am not aware on whales, Senator Murkowski. I have no knowledge of right now of whether Canada whales at all or not, like we do.

Senator **Murkowski**. I see. But you would have a concern over activity associated in Canadian waters as the whales pass through there, if they were distracted by activity, I assume.

Mr. **Leavitt**. Yes, we would.

Senator **Murkowski**. Tell me, as you pursue your subsistence lifestyle, how many caribou would you take a year for your family?

Mr. **Leavitt**. Five or six.

Senator **Murkowski**. And would these come from the Central Herd in the Prudhoe Bay area, generally? Is that a fair geographical conclusion?

Mr. **Leavitt**. Well, I am not sure whether the Central Herd goes clear over to the Sipic Lake area, which is 100 miles west of Barrow.

But I know most of our caribou in Barrow area is gotten, I think, from what is called the Western Caribou Herd, which numbers even larger than the Porcupine Caribou Herd.

Senator **Murkowski**. Do you have any observations of whether that herd, which I gather would be subjected to the pressure of subsistence hunting by the people of Barrow, is maintaining its own size? Increasing or decreasing?

Mr. **Leavitt**. Sure. Both the Arctic Slope region and Tanana region use that caribou herd, and they have not declines.

Senator **Murkowski**. I see. And there has been activity of some nature in the area.

Mr. **Leavitt**. Well, when they had NPRA exploration, there was a lot of activity with NPRA. And nothing happened to that caribou herd.

Senator **Murkowski**. You did not notice any displacement as a consequence of activity? Drilling pads they put in, airfields, or any displacement of calving areas or survival rates of calves?

Mr. **Leavitt**. Maybe placements in the summer. I mean, if you build a pad, that is taking caribou away from march, from tundra. And he would probably go to that, because there are less mosquitoes there in the summer, on the pad.

Senator **Murkowski**. You have observed caribou on pads, because it gives them relief from mosquitoes, or whatever?

Mr. **Leavitt**. Yes.

Senator **Murkowski**. So you might say it enhances the caribou in some respects.

Mr. **Leavitt**. In the early years in Prudhoe Bay, for instance, we would have delays in terms of landing because they would have a problem of trying to drive the caribou off the landing strip.

Senator **Murkowski**. I see. And they go on the landing strip because——

Mr. **Leavitt**. There are less mosquitoes on there, because you need water and marsh to——

Senator **Murkowski**. What is your observation of what the biologists tell us about the Central Herd, the Prudhoe Bay herd, increasing from 3,200 animals to 13,000, 14,000 from 1972 to the current date.

How do you explain that as a hunter and one who observes the activity on the North Slope? Recognizing that we when we build a pipeline, we have got gathering lines, we have got gas reinjection facilities.

There has been more activity there, I guess. How come they are increasing?

Mr. **Leavitt**. Probably no predators. They just increase, like anything else. They probably just did not study them before, and now they have to study them because man has to go up there and produce oil and they probably never noticed them before.

Senator **Murkowski**. What is your opinion of applying to the Porcupine Herd a similar application, based on the experience we have had with the Central Herd, Prudhoe Bay as to what might happen if the Congress does allow the exploration in ANWR, and there is proven oil and production?

What is your prediction on the displacement? Do you think there is a parallel with Prudhoe Bay that could be applied to the Porcupine Herd? Or is it for other reasons distinct and separate?

Mr. LEAVITT. I think that industry has made great strides. For instance, Prudhoe Bay, 20 years ago, 15 years ago, we were scared of what would happen to the caribou herd. And there was a big outcry by the Eskimos, us included.

We were the first ones to take them to court. And we have been proven wrong. In the Kuparuk field, which is adjacent to Prudhoe Bay, which is just west of Prudhoe Bay, they now have what they call service bases, which are even better than what is in the facilities of Prudhoe Bay.

We think that they will even do better in the Coastal Plain, because they have these service bases. And no company has facilities in any place and anywhere that they want. They have to be in these service bases.

So all human contact is in one place, and not scattered all over.

Senator MURKOWSKI. I noted you were in the audience, with regard to the governor's position for the state, indicating that the area should be defined further, based on scientific studies, and perhaps putting in some kind of simulation in ANWR.

I do not mean to paraphrase the governor. But I think it is fair to say that he suggested something like that, so that we could get some experience as to whether whatever these simulations might be, whether they would have an effect on displacing the caribou.

Could you comment on whether you feel that that kind of thing would be practical, or provide evidence? It would seem to me you would have to know what was occurring on that particular parcel over a period of time before you put something on it. But I certainly do not know.

Mr. LEAVITT. I think that is a waste of time to put up a simulation, a cardboard box or a building or something, when you have got the experience of Prudhoe Bay and you have got the pipeline.

You do not need to study a caribou herd, because it has been done. People were afraid, the same people were afraid about what the effect of the pipeline would be. And the caribou is all along the pipeline. It does not bother them.

Senator MURKOWSKI. So the idea of putting something up in various places, if you studied it you would know whether it was displacing the caribou. Would you not?

Mr. LEAVITT. What does a displaced caribou look like?

Senator MURKOWSKI. I assume it looks like any other caribou. I guess they taste the same. You would know better than I.

What do you think of the state's proposal to have a 7 year period, in which time the matter would come back to Congress for a veto, I think, is what is implied in the governor's statement?

Mr. LEAVITT. Our position is, we do not agree with that.

Senator MURKOWSKI. Could you tell us why you do not agree with that?

Mr. LEAVITT. A caribou calves where it calves. Somehow, some place, somebody has pointed the idea that the Coastal Plain is the maternity ward.

Senator **Murkowski**. The Coastal Plain is the maternity ward.

Mr. **Leavitt**. Well, that is what they have painted the picture as, as this is where they have got to go.

Senator **Murkowski**. Probably one of the notable quotes from this hearing.

Mr. **Leavitt**. I mean, caribou have calves in Canada. Caribou have calves in Alaska, and out on the Coastal Plain. And some in the Coastal Plain, but you can not say this is where they all have calves.

There is no particular area. I mean, they are calving now. But there is no particular area where I think that you can point to and say, this is the core.

Senator **Murkowski**. How do you explain the state's position, where they seem to indicate a real concern?

And they have got their biologists that have allegedly, I think in the statement there are 13 biologists, had meetings and so forth, and have come up with the conclusion.

And as near as we have been able to gather, the governor said, I think, a couple of hundred thousand acres might be the area.

How do you explain the state's insistence, if you will, and the change by the Department of Interior where they at first acknowledged that there appeared to be a concentrated area, and now they say, as you seem to point out, that they calve where they calve?

Mr. **Leavitt**. Senator, I can not explain the state's position of why they are feeling that way. I do not know what is in the governor's mind or his people.

Senator **Murkowski**. If they are scientists and biologists?

Mr. **Leavitt**. I mean, scientists and biologists come to us all the time about many different things, and we do not believe them either.

Senator **Murkowski**. I see. On a different subject, Mr. Chairman, the question of land swaps has been discussed before this Committee.

And as you have observed, there has been some interest by some Members, perhaps more than some people in the audience thought. There appears to be some rather strong opinions formulating on behalf of the Committee with regard to swaps.

Now you folks were one of the first recipients of a land swap. It is my understanding, and in your testimony you stated, that you got about 92,000 acres by action of the Federal government, and in return I believe, if my memory is correct, you gave up about 100,000 acres, which is now the magnificent Gates of the Arctic.

We are hearing proposals from others that the bear refuge on Kodiak Island be exchanged, given to the Federal government for a position. How do you feel about the concern of exchanges?

Because we have a question, what is in the best interest of the Federal government, certainly, and the governor of course is concerned about the best interests of the state, and perhaps the largest financial return.

And if there are exchanges given to, say, corporations, that means that the state will not have the royalties from that directly, but they will go to a corporation.

Could you kind of give your opinion, having been one of the only witnesses that will be appearing before us that actually has a position in ANWR?

Mr. LEAVITT. In the current land exchanges, we are not currently involved in that. But if you are referring to our land exchange we did in 1983, what would happen, are you asking about——

Senator MURKOWSKI. Well, I assume you feel it was a good thing for your people. But by the same token you gave up an asset that you had which is now Gates of the Arctic, which is a good thing for the Federal government and the people of all America.

Mr. LEAVITT. Sure.

Senator MURKOWSKI. And I guess what I am asking for is your opinion on whether these should seriously be considered by further exchanges? Or whether one is enough?

Mr. LEAVITT. We do not disagree with land exchanges, certainly. I mean, we support whatever the others can get and give up. But they at least be comparable.

Senator MURKOWSKI. Do you think it is good for the Federal government and good for the state?

Mr. LEAVITT. Sure.

Senator MURKOWSKI. What is your recommendation on the timing of the exchanges? If I recall the governor's position was, this is not the time. It should be after Congress makes a decision. And if Congress does authorize, then that is the appropriate time to consider the exchange.

Mr. WICKER. Senator, let me step in if I could for a moment.

Senator MURKOWSKI. Sure.

Mr. WICKER. Let us be clear that Arctic Slope Regional Corporation is not presently negotiating a land exchange with the Department of the Interior. You have referenced the 1983 exchange.

The exchanges, no doubt, are going to be weighed very carefully in terms of the relative values that the native corporations would bring to the table versus what they would acquire in the refuge.

But being observers to this process, as we understand it, there will be no final decisions about these exchanges until the matter is submitted to the Congress for determination.

Senator MURKOWSKI. My point in pursuing this was to simply address whether an exchange concept is in the interests of our Federal government.

I do not know what your evaluation of the Gates of the Arctic is. I personally have my own, having been there and viewed it. But I think that there are some senators here who are very concerned about the equity of an exchange.

And I assume that you feel that you got fair value for what you gave up. That is what I would like you to address, if you will.

Mr. WICKER. I think, Senator, again that the parties to those negotiations will be bargaining very hard to arrive at what they consider to be a fair exchange.

Senator MURKOWSKI. Did you think you had a fair exchange?

Mr. WICKER. ASRC believes that it had a fair exchange? There are some differences between the ASRC exchange that took place in 1983 and the current exchanges.

Without getting into detail, it is spelled out in an attachment to Mr. Leavitt's statement, that takes you through the lengthy process that ultimately consummated the land exchange in 1983.

The difference is that ASRC's ownership of the subsurface at Kaktovik is beneath village-owned surface estate. As you will recall, Senator, in the original Settlement Act of 1971, the ASRC, the regional corporation, was not allowed to receive conveyance to the subsurface in both the Arctic National Wildlife Range as well as the then Naval Petroleum Reserve No. 4.

As a result of subsequent actions by the Congress, in particular in 1980 with the passage of the Alaska Lands Act, there was a recognition that under certain circumstances, ASRC would be able to acquire the subsurface beneath village lands in both of those Federal reserves.

So this goes way back to 1971, with reference to Arctic Slope itself.

Senator MURKOWSKI. You had considerable risk associated with that exchange because, previous testimony by the Department of Interior and witnesses the day before yesterday addressed the interests that Arctic Slope has with an oil company, having drilled one well in the area near Kaktovik.

Now, if we do not open ANWR, and you may have information one way or another of whether that well is worth anyting, could you develop your resource and market your oil?

Mr. WICKER. Well, the 1983 exchange, of course, was carried out under administrative exchange authority granted to the secretary of the interior in the Alaska Lands Act of 1980. That is Section 1302(h).

In the exchange, it was recognized by ASRC and the department, that the existing prohibition on production of oil and gas from the Arctic National Wildlife Refuge would foreclose a production, unless Congress were to act to lift that prohibition.

Senator MURKOWSKI. Finally, let us assume that we do not open ANWR. Can you get back from the Federal government the 100,000 acres that you gave them in consideration for your position in ANWR, the 92,000? Can you get back the Gates of the Arctic?

Mr. WICKER. No. Under the 1983 exchange agreement, ASRC would not be entitled to exchange back the Gates of the Arctic National Park.

Senator MURKOWSKI. So you took all the rest, then, and gave title to Gates of the Arctic, and if you do not generate any subsurface recovery, why, that is it.

Mr. WICKER. That is it. But I think that is why Mr. Leavitt is here today to testify before this Committee in support of opening the Coastal Plain to oil and gas leasing.

Senator MURKOWSKI. I have no further questions.

Senator WIRTH. Thank you very much, Mr. Leavitt, Mr. Brower. We appreciate your being here and will include your statements in full in the record.

Our final panel includes Mr. John Titus from Venetie, Alaska, Mr. Lincoln Tritt, Arctic Village, Alaska, and Ms. Sarah James from Arctic Village, Alaska. If you all could please come up to the hearing table, we are delighted to have you here.

While you are coming up I would like to insert in the record a letter from the regional office of the Environmental Protection Agency, dated June 1st this year, sent to the Hon. William P. Horn, on the Arctic National Wildlife Refuge report, the EPA's final Legislative Environmental Impact Statement analysis.

And while we are waiting I might read into the record the first three paragraphs of that reaction from EPA.

> The EPA has reviewed the final Legislative Environmental Impact Statement and Report to Congress concerning the proposal to allow oil exploration, development and production within ANWR. This letter, with its enclosure, provides EPA's comments on the recommended action and alternatives that were considered.
>
> On February 6, 1987, EPA commented on the draft LEIS and recommended that several elements of the document were in need of revision or expansion. The final LEIS has undergone significant revisions since the draft LEIS. Although additional discussion has been provided in response to many of our comments, the majority of EPA's concerns have not been adequately addressed in the final LEIS. In several important instances, EPA's level of concern has been increased by the revisions made to the document.
>
> In reviewing the final LEIS, EPA found a document incomplete in its presentation of scientific data that would support the impact conclusions and the secretary's recommendation. A large body of scientific information on the 1002 area's resources has been collected in recent years by the U.S. Fish and Wildlife. Likewise, information specific to the existing environmental regulatory program, including monitoring information, is available. Yet, this information does not appear to be reflected in the final LEIS.

Those are the opening three paragraphs of EPA's analysis. And without objection, that will be included in full in the record.

[The information referred to follows:]

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

WD-136 June 1, 1987

Honorable William P. Horn
Assistant Secretary for Fish and Wildlife and Parks
United States Department of the Interior
18th and C Streets, NW
Washington, D.C. 20240

Re: Arctic National Wildlife Refuge Report
Final Legislative Environmental Impact Statement

Dear Mr. Horn:

The Environmental Protection Agency (EPA) has reviewed the final Legislative Environmental Impact Statement (LEIS) and Report to Congress concerning the proposal to allow oil exploration, development, and production within the Arctic National Wildlife Refuge (ANWR). This letter, with its enclosure, provides EPA's comments on the recommended action and alternatives that were considered.

On February 6, 1987, EPA commented on the draft LEIS and recommended that several elements of the document were in need of revision or expansion. The final LEIS has undergone significant revision since the draft LEIS. Although additional discussion has been provided in response to many of our comments, the majority of EPA's concerns have not been adequately addressed in the final LEIS. In several important instances, EPA's level of concern has been increased by the revisions made to the document.

In reviewing the final LEIS, EPA found a document incomplete in its presentation of scientific data that would support the impact conclusions and the Secretary's recommendation. A large body of scientific information on the 1002 area's resources has been collected in recent years by the U.S. Fish and Wildlife Service (FWS). Likewise, information specific to the existing environmental regulatory program (including monitoring information) is available. Yet, this information does not appear to be reflected in the final LEIS.

The final LEIS constitutes the first step in the Secretary's recommendation for Congressional decision-making that must balance economic needs and environmental risks. Greater attention to, and better use of, the resource data that have been generated in ANWR and elsewhere on Alaska's North Slope can provide for a better understanding of the following environmental priorities:

> Assurance that the overall significance of environmental impacts, including cumulative impacts, and the ability to mitigate them are properly stated. In particular, we do not believe it appropriate to suggest that the Prudhoe Bay experience would be duplicated in ANWR. The data in the LEIS are insufficient to support such a conclusion.
>
> A wider range of limited exploration/development leasing alternatives are developed and considered. The impacts of the limited leasing alternative (Alternative B) as revised in the final LEIS are now of the same high level of concern as for full leasing (Alternative A).
>
> Identify potential regulatory conflicts which may involve interagency coordination. We are concerned about potential regulatory conflicts if, for example, leasing were proposed in environmentally sensitive areas for which the granting of other necessary permits would be inconsistent with existing laws and policies.

These and other concerns are discussed further in the enclosure which represents a summary of our more detailed technical review comments.

Based upon the inadequacy of the information presented in the final LEIS, EPA would normally recommend that a revised document be prepared. The final LEIS remains in need of corrective measures that require substantial changes, including the expansion of the range of alternatives, in order for it to be an adequate basis for any Congressional action. Since Congressional hearings have already begun, EPA recommends that the Secretary of the Interior's final recommendation to Congress be modified to better reflect the available scientific information.

Thank you for the opportunity to review the final LEIS. If the Department of Interior has questions about EPA's comments, please feel free to contact me directly or Mr. Alvin L. Ewing, EPA's Assistant Regional Administrator in Anchorage. We look forward to answering your questions and helping you prepare the final recommendation to Congress.

Sincerely,

Robie G. Russell
Regional Administrator

Enclosure

EPA REVIEW COMMENTS
ARCTIC NATIONAL WILDLIFE REFUGE
FINAL LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

The primary issues and concerns identified during EPA's review of the ANWR final LEIS are outlined below. Comments are broadly organized under three major headings; Responsiveness to Comments, Technical/Scientific Issues, and Alternatives Analysis.

RESPONSIVENESS TO COMMENTS

The final LEIS has acknowledged most of EPA's concerns expressed in our comments on the draft document. However, an adequate analysis of the impacts associated with these issues is not apparent. Detailed analysis of the following issues, as referenced from our previous correspondence, remains a prerequisite to rational decision-making.

Air quality: Available knowledge of Prudhoe Bay development effects was not utilized, evaluation is deferred to future analyses.

Water and gravel supply needs: Significant shortages are acknowledged, but the final LEIS has not presented an adequate analysis to show whether water quantity/gravel quantity are sufficient to support the recommended action. The final LEIS assumes that major adverse effects can be handled in a manner which will not result in adverse impacts to water quality or habitat.

Marine transportation facilities: Existing significant impacts due to causeways around Prudhoe Bay are not reflected.

Wetlands: Only a very limited evaluation of large-scale hydrologic impacts and habitat fragmentation has been conducted. If the hydrologic impacts are greater than the brief discussions imply, the large amount of wetland acreage that could be affected could be greater.

Mitigation: The effectiveness of proposed measures is not evaluated. Discussions about rehabilitation are incomplete.

Regulatory processes: There is no discussion of how the new authorities requested by the Secretary in his recommendation would relate to existing environmental laws, other than that a leasing program 'might' require compliance with NEPA, the Clean Water Act, and the Clean Air Act.

Noise impacts: There is no quantitative evaluation of noise levels which makes it difficult to reliably assess the disturbance effects on sensitive wildlife species.

Cumulative effects: The final LEIS acknowledges cumulative effects by providing a list of projects which might occur but does little to actually evaluate their effects.

Subsistence impacts: An expanded discussion of the off-ANWR effects on distant inland native settlements has been provided. The impacts to the exchange network from the recommended action have not been evaluated.

These issues remain important even from a programmatic perspective. Their significance is increased by the Secretary's proposed recommendation that the final LEIS be statutorily adopted as the EIS for the leasing program itself. We disagree that this document is adequate for that purpose. Specifically, the leasing program inferred from the final LEIS might not provide the opportunity to consider alternatives for individual lease block deletions. Such deletions could be aimed at locally reducing risk to environmentally sensitive tracts. A greater degree of site-specific information (e.g. a tiered EIS) is necessary to evaluate such a program.

TECHNICAL/SCIENTIFIC ISSUES

In a variety of instances, the final LEIS conclusions and the Secretary's Recommendations do not appear to be well substantiated by the information provided in the draft and final LEIS.

Definitions of Impact Significance:

Definitions of significance of impacts are inappropriate in many cases. For example, impacts are not considered "major" in the final LEIS unless they exceed 30 years or more duration. For many fish and wildlife species, several generations could be adversely affected within this time, leading to severe population- and community-level impacts.

The final LEIS is inconsistent in its application of impact definitions. Often discussions in the text describe a "moderate" effect, but it is labeled in the conclusions as "minor."

Also, impacts are in many cases down-graded from the draft LEIS without any explanation or justification. The final LEIS has numerous examples of impact conclusions that are minimized in this manner. It is not clear on what basis these changes were made in the preparation of the final LEIS. As one example, modification of 12,650 acres of wetlands was evaluated in both the draft and final LEIS. The draft labeled this as a "moderate" effect, but in the final it was down-graded to "minor" with no explanation. Considering the potential for hydrologic disruption and habitat fragmentation, the impact could be "major".

Underestimation of Impacts:

Potential underestimation of impacts occurs throughout the LEIS. This is particularly true of impacts predicted for the Porcupine Caribou Herd (PCH), largely because they are based on selectively-chosen data from the Central Arctic Herd (CAH) in the vicinity of Prudhoe Bay. For example, the text notes that although the CAH no longer calves where development occurs around Prudhoe Bay, it has nonetheless increased in size. This is used as a basis to conclude that development in the 1002 area (and subsequent displacement) should similarly not affect the PCH. However, the text notes a variety of important differences between these two herds which include:

1) the CAH has a much lower population density;
2) the majority of the CAH's important calving grounds have not experienced development activities;
3) the CAH's calving grounds have not become overcrowded (even with displacement due to development around Prudhoe Bay); and
4) predation by wolves and brown bears on the CAH has been minimized.

These differences strongly suggest that the LEIS predictions, based on data for the CAH, are likely to underestimate impacts to the PCH.

Placing such emphasis on CAH data is not necessary. A large body of data on the PCH (summarized in the 1002 Area Final Baseline Report) has been gathered by FWS in the last few years. The Final Baseline Report contains additional PCH data that appear to not be adequately reflected in this final LEIS. The final LEIS conclusions are apparently not based on all the available information.

Mitigation:

The mitigation discussions throughout the final LEIS raise several concerns. The entire 1002 area has been designated Resource Category 2. However, several discussions in the text make a distinction in habitat value. The overall "2" designation is not supported by the information in the final LEIS. The final LEIS indicates that site-specific habitat designations will be conducted during the site-specific development/production phase. Characterization of habitat after leasing and exploration has occurred could result in habitat being upgraded to Resource Category 1. The impacts may not be mitigatable.

Mitigation discussions in the final LEIS are incomplete. The final LEIS assumes that mitigation measures will be both consistently implemented and completely successful. No analysis or references are provided to support these assumptions. Rather, the final LEIS states that the experience at Prudhoe Bay provides a basis for minimizing or eliminating adverse effects through the careful application of mitigation measures tested in that area. As the Corps of Engineers noted in its comments on the draft LEIS, industry has been reluctant to apply compensatory mitigation and restoration techniques on the North Slope, except in very limited experimental circumstances. EPA's own extensive experience with the major operators at Prudhoe Bay supports this conclusion; rehabilitation technology for the North Slope is particularly lacking.

Cumulative Effects:

Cumulative effects are not adequately evaluated in the final LEIS. The final LEIS provides a list of criteria for determining which actions should be included in the cumulative effects analysis. The criteria appear to be unduly restrictive and narrow the focus of the analysis. By using these criteria, a list of projects that constitute the cumulative case scenario has been developed for the final LEIS. Use of the criteria has resulted in only existing projects being considered. The potential for future large-scale development of offshore Beaufort Sea leases, oil and gas development in the Canadian Arctic, and construction of large diameter gas pipelines are only marginally considered.

The final LEIS suggests a particular development infrastructure that may result from ANWR leasing; however, other scenarios are possible. No useful cumulative effects analysis is presented either for those projects and activities listed or for other reasonably foreseeable scenarios. For any scenario, an adequate effects analysis must begin with a full reflection of existing impacts. For example, the LEIS could have described the existing cumulative effects to anadromous fish attributed to causeway construction in the Prudhoe Bay area. These effects are "major" by the final LEIS definitions. Conclusions regarding level of impacts should include the cumulative effects that are reasonably foreseeable.

Air Quality:

The final LEIS does not adequately assess primary and secondary air quality impacts. Secondary air quality effects (e.g., arctic haze and acidification of tundra) may result from upset situations and normal low level emissions even if standards are being met. Impairment of visibility is a potential impact where there is increasing concern relative to existing north slope emission sources.

ALTERNATIVES ANALYSIS

Alternative B, limited leasing, has been substantially revised in the final LEIS. This alternative is purported to reduce the impacts to the PCH; it implies that the most important calving area would be protected by setting aside the area where multiple years of heavy use overlap. However, the basic concept behind the limited leasing alternative appears to be flawed. The "overlap" area is merely the FOCUS of where concentrated calving has repeatedly occurred in the most recent years.

Alternative B is further complicated by other assumptions within the final LEIS. For example, the document states that only 27 percent of the "concentrated" calving area for the PCH exists in the 1002 area. In contrast, the draft LEIS stated that 80 percent of "core" calving was in the 1002 area. Although both statements may be statistically correct, the final LEIS does not point out that the 1002 area's 27 percent of the PCH's "concentrated" calving grounds has experienced approximately 85 percent of the PCH's total calving. The question of whether this small area can physically support calving for a significant proportion of the PCH casts doubt on the potential for Alternative B to satisfactorily reduce identified environmental risks.

Changes made to Alternative B have reduced the geographical area slated for maximum protection within the 1002 study area. The rationale for these changes have not been tied to a biological foundation. Therefore, Alternative B is now of the same high level of concern as Alternative A (full leasing). EPA believes that a new limited leasing option should be developed that can achieve the stated objective of substantially reducing impacts to the PCH while still allowing for development of oil resources. Alternative C, further exploration only, remains environmentally preferred should Congress consider only those alternatives presented by the Department of the Interior. Independent expert review of all information generated during the exploration activities outlined in Alternative C should be encouraged.

Senator MURKOWSKI. I wonder if at this time I could recognize the three gentlemen who have been here from EPA. Mr. Richard Sanderson, director of Federal activities, Mr. William Dickerson, division director, liaison division of OFA, and Mr. William Garvey, staff, and I believe it is David Scott. Is that correct? Congressional liaison.

And I think it is appropriate that as we refer to the criticism by EPA of the Legislative Environmental Impact Statement of the Department of the Interior, that it be kept in perspective.

Because obviously it is one Federal agency challenging the adequacy of a process of another Federal agency, which always provides justification for both Federal agencies doing their jobs.

So as we proceed with this oversight, it will be I think appropriate that we indeed have an opportunity to pursue EPA's generalizations and charges of inadequacy of scientific information.

And it is indeed extraordinary to me to note the expertise that EPA evidently has assimilated over 32 days in the migratory habits of the caribou, above and beyond that of virtually all the biologists. But I do not want to get carried away on that.

Senator WIRTH. Thank you, Senator Murkowski. I just again would say that this report was sent June 1 to Assistant Secretary Horn.

I am sorry it was not available when Secretary Horn was here the day before yesterday. I think certainly we will have an opportunity to review this and any related information that other parties may feel appropriate on EPA's statement.

At this point also I am going to ask if Senator Murkowski would be kind enough to chair the hearing and conclude today's activities. And again, we thank you all very much for being here.

Senator Murkowski, thank you very much for bearing with us in the change of command here. We really appreciate it. And thank you very much.

You all are familiar with the rules of the Committee. We look forward to hearing from you and to working with you, and we thank you very much for coming.

Please proceed in whatever way you think would be most helpful to the Committee. Perhaps Mr. Titus, is that how you would like to begin? However would be appropriate.

Senator MURKOWSKI [presiding]. Thank you very much, Mr. Chairman. Since the change in the control of the Senate, this is indeed a rare opportunity.

Senator WIRTH. Well, we try to be as ecumenical as possible, in hearing from Republicans and the EPA.

Senator MURKOWSKI. Thank you very much. Please proceed.

[Subsequent to the hearings EPA submitted the following:]

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C. 20460

THE ADMINISTRATOR

Honorable Frank H. Murkowski
United States Senate
Washington, D.C. 20510

Dear Senator Murkowski:

Thank you for your letter of June 26, 1987 requesting clarification of EPA's comments on the Department of the Interior's ANWR LEIS.

Your recollection of our June 25 meeting is correct:

> "EPA's comments should not be read as a recommendation that Congress not move forward on proposals to authorize oil and gas leasing on the coastal plain of ANWR. Rather, EPA believes that the LEIS did not incorporate all of the available data and that Congress should take that data into account as it continues to examine this issue."

If I can be of any further service to you in the explanation of EPA's position on this matter, please do not hesitate to contact me or Mr. Robie Russell. Your staff may desire to contact Alvin L. Ewing, EPA's Assistant Regional Administrator for Alaska, on questio of a more technical nature.

Sincerely,

Lee M. Thomas

STATEMENT OF LINCOLN TRITT, CHIEF, ARCTIC VILLAGE, AK

Mr. TRITT. My name is Lincoln Tritt. As chief, I am here to testify on behalf of the native peoples of Arctic Village, Alaska.

We are objecting to the proposal of exploration and development of gas and oil on the Arctic National Wildlife Refuge, because at this point we feel it is a threat to our survival, which is very dependent on the caribou herd. The situation as it is right now is pretty well suited to our use of our resources for food.

To begin with, I do not think any person living in the urban area has any idea whatsoever of what living in the bush is like, although most decisions pertaining to bush living are made by people who live in the urban setting. This is unfortunate, since it complicates what is already a harsh life.

I suppose most people really have no idea what it is like when the temperature is below zero. In my area the winters are long and dark, and in that time the temperatures rarely get above zero. We are talking about four to six months in which the sun stays on the opposite side of the world. December 21st is the winter solstice, and at that time if we have a cloudy day we have daylight for about an hour, two hours on a clear day.

Also, during that time the air transportation is completely at the mercy of the elements, since our village is situated in an enclosed valley, surrounded by mountains. I would urge the Committee Members who are visiting Alaska this summer to pay particular attention to the terrain. The bush range consists of rugged mountains.

And in the so-called 1002 area, it is mostly flat ground where the calving takes place. In order for the caribou to reach our village, they have to go through passes. And any displacement of the caribou area would have an effect on the migration route of the herd.

The cost of our groceries are generally twice that cost of groceries in the city of Fairbanks. So due to the remoteness and inaccessibility of our village, without the caribou we are totally at the mercy of the air service, who is at the mercy of the weather.

We have no other kind of transportation to and from the village. But my people have hung on to that area of Alaska for many years, in spite of hardships and oftentimes famine. They did this because they believe in the land, and I do not intend to doubt generations of faith.

Our cultural values and teachings have been based on our nomadic political structure. And the caribou is the very foundation of the value system. The children of our ancestors were taught accordingly, and a lot of the teaching methods still prevail today.

The caribou herd is important to us because it is reliable, and it is the only food source which is an adequate supply for a long period of use.

According to some older residents, there was an instance of calving on the Arctic Village area at one time, and the result was disastrous. Aproximately a quarter to a half of the herd had died off, which points out that outside the calving area the herd has very little chance of survival.

The area in our village gets very little wind. So the snow tends to pile up, and is not blown off and kept to a minimum level like it is on the slope. So the caribou and the calves mainly are very vulnerable to predators.

West of the Arctic Village, they tell me that they have not seen any caribou, they saw their first caribou that winter, the first since 7 years ago. So there is evidence that the pipeline and activities does have an effect on the caribou migration or caribou herd.

I would hate to see that happen in my village, becuase I hate to see the results. Our village is very dependent on the caribou. It is our main food supply.

I was in Prudhoe Bay in the fall of 1986 and I saw the caribou there in the drilling sites and the pipeline. These are not the type of animals my people would hunt and eat. To us these are not exactly what a healthy caribou looks or acts like.

I think there are differences between wild animals and animals that are exposed to man, both physically and psychologically. I believe that the balance of nature is very delicate in the Arctic, and the healthy animal has a lot better chance of survival than a weak one.

You must remember that the Arctic is already a hard place to live, even when healthy. The way the area is treated will play a vital part in the future of that area.

There are some who suggest that there be more studies done before any more drilling or exploring is done. I think that is a good idea. Because the time that Prudhoe Bay has been in operation is hardly enough time to determine the affect it has on animals that have existed there for thousands of years.

Also let us reevaluate the Prudhoe Bay experience,and correct our mistake before we waste what would be the only thing we have left. All the problems that Prudhoe Bay promised to cure are exactly what we have now.

Again, I would like to remind you that the caribou herd and the Arctic National Wildlife Refuge is the very essence of our existence. And at this time there is nothing more reliable.

On Tuesday the secretary was saying that in Alaska we harvest 1,000 caribou a year. I disagree with that. We harvest a lot more than 1,000 caribou a year. I think OPEC and the Arabs have already proven that they can win the energy wars of the price wars.

Those problems should be dealt with before we go headlong into more exploration, more development, and not waste any more or our resources. There has been a lot of emphasis on the size of ANWR. But you have to remember that the Coastal Plain is a key to the whole area. That is the beginning of the wildlife.

Exploration and development advocates will focus your attention on the 1002 area. That is where the wildlife starts. From there the rest of the 1002 area gets their birth, so to speak.

The secretary mentioned his visit to Prudhoe Bay. Everybody who has been in the military knows that before any inspection there is always a frantic cleanup effort. If I was a drilling operator, I certainly would not show him my oil spills, trash, or any scars I might have made.

Aside from all of this, I would like to point out that to us this is not an energy or environmetal issue. This is an issue of human survival. The Arctic National Wildlife Refuge is vast, and the so-called 1002 area is the heart of all wildlife of the refuge.

With that, I turn the mike over to John Titus. Thank you.

[The prepared statement of Mr. Tritt follows:]

TESTIMONY OF CHIEF LINCOLN TRITT

ARCTIC VILLAGE TRADITIONAL COUNCIL

before the

UNITED STATES SENATE ENERGY AND NATURAL RESOURCES SUBCOMMITTEE ON PUBLIC LANDS AND RESERVED WATERS

June 4, 1987

"Mr. Chairman, members of the committee, my name is Lincoln Tritt, and as Chief, I am here to testify on behalf of the Native people in Arctic Village, Alaska.

We are objecting to the proposed exploration and development of gas and oil on the Arctic National Wildlife Refuge (ANWR) because we feel it is a threat to our survival, which is very much dependent on the caribou herd. The situation as it is right now is pretty well suited to our use of our resources.

To begin with, I do not think any person living in the urban areas has any idea whatsoever what living in the bush is like, although most decisions pertaining to bush living are made by people living in urban settings. This is unfortunate, since it complicates what is already a harsh life.

I suppose most people already have an idea what it is like when the temperature is below zero. In my area, the winters are long and dark and in that time the temperature rarely gets above zero. We are talking about six months in which the sun stays on the opposite side of the world. December 21st is the winter solstice and at that time if we have a cloudy day, we have daylight for about an hour, two hours on a clear day.

Also, during that time, the air transportation is completely at the mercy of the elements, since our village is situated in an enclosed valley, surrounded by mountains. I would encourage the Energy Committee members who are traveling to Alaska this August to make special note of the rugged nature of the Brooks Range. You will notice that there are very few passes through which the caribou can pass. Development that affects calving grounds would change the migration route.

I was in Prudhoe Bay in the fall of 1986 and I've seen the caribou that were roaming the drilling site and the pipeline. These are not the type of animals my people would hunt and eat. To us, these are not exactly what a healthy caribou looks or acts like. I think there are differences between wild animals and animals that are exposed to man, both physically and psychologically.

I believe that the balance of nature is very delicate in the Arctic and a healthy animal has a lot better chance of survival than a weak one. You must remember that the Arctic is already a harsh place to live, even when healthy.

The way the area is treated will play a vital part in the future of that area.

There are some who suggest that there be more studies done before anymore drilling or exploring is done. I think that is a good idea, because the time that Prudhoe Bay has been in operation is hardly enough time to determine the effect it has on animals that have existed there for thousands of years. Also, it lets us reevaluate the Prudhoe Bay experience and correct our mistakes before we waste what could be the only resource we have left. All the problems that Prudhoe Bay promised to cure are exactly what we have today.

I disagree with what Secretary Hodel said two days ago, that we in Alaska only harvest 1,000 caribou a year. We harvest much more than that.

Much has been said about OPEC and the Middle East. OPEC still has control over the oil price, which they provided during the last energy shortage. Until we can prove that we have some control, we should not waste anymore of our nonrenewable resources. What about alternative energy sources?

There has also been a lot of emphasis on the size of the Arctic Refuge, but the Coastal Plain is the key. Exploration and development advocates will focus your attention on 1002 area. Wildlife in Arctic Refuge starts in the 1002 area.

Secretary Hodel also mentioned his visit to Prudhoe Bay, but everybody who has been in the military knows that before any inspection, there is always a frantic cleanup effort. If I was a drilling operator, I certainly wouldn't show him any oil spills, or trash, or any scars I might have made.

Aside from all this, to us, this is not an energy issue nor an environmental issue, it is an issue of human survival.

Again, I would like to remind you that the caribou herd in the Arctic National Wildlife Refuge is the very essence of our existence and at this time there is nothing more reliable.

The Arctic National Wildlife Refuge is vast and the so-called 1002 area is the heart of all the wildlife of the Refuge.

Thank you.

Senator MURKOWSKI. Thank you very muck, Mr. Tritt.

The next witness, Mr. John Titus.

STATEMENT OF JOHN TITUS, COUNCIL MEMBER, VILLAGE OF VENETIE, AK

Mr. TITUS. My name is John Titus. I am a council member of Venetie village, and also a school board member for the Yukon Flats school district.

It is a privilege, an honor for me to be given the opportunity to say a few words on behalf of my people in Venetie. I am grateful that it is happening before Hon. Murkowski. I always have a hard time pronouncing his name, although I asked people to vote for him the last couple of elections.

Senator MURKOWSKI. Thank you. That may be included in the record.

Mr. TITUS. Before my people asked me to come down to Washington to testify, I really was not aware of what was going to take place.

But the issue that I found on my way down before I left and got down here, the issue was caribou. I am a married person, and I have eight children. All my children, should I say, are addicted to caribou, because I have been raising my family with caribou meat.

I have lived in Alaska all my life. And it is just like buying an addiction from my children, to take the caribou away from my family. I do not think any body knows what would happen to caribou if we go ahead with the exploration in the Coastal area.

No one can come up and say, nothing is going to happen to the caribou or Porcupine Caribou Herd in Venetie. I do not recall the exact year, but when the pipeline was put in, and all; this time has elapsed, and the caribou has begun to spread out in the Venetie area.

This winter was the first time that there was a caribou in that particular area. And they are all over that area. That indicates that the pipeline had something to do, detrimental to the caribou herd.

My people in Venetie, in 1971 when we had a land claim bill that we choose to retain rather than take part in the corporation and the money, the reason we choose the land was to continue our practice, our tradition, and our native culture.

We felt that if we take part in the other corporation, we would lose our culture. This is why we retain our land, and choose our way of life and practice our tradition. The people that are very familiar with this are the old people, and around my village, and also the caribou have lived with them all their life.

I do not need a written statement before me to appear before you people. Because when it comes to caribou, you are talking about my life. I do not need to be quoted, or I do not need to be instructed by another person, or legal counsel to be sitting next to me, and advise me on what to say.

I am here because the caribou pertains to me. It pertains to my family, it pertains to my people. If the caribou meat on the table for my children becomes jeopardized, well then I must declare war. That is the way I feel about the caribou.

I want to thank each and every one of you for listening. Thank you very much for this opportunity.

[The prepared statement of Mr. Titus follows:]

TESTIMONY OF JOHN TITUS
As Written By Lisa Jaeger

NATIVE VILLAGE OF VENETIE

before the

UNITED STATES SENATE ENERGY AND NATURAL RESOURCES
SUBCOMMITTEE ON PUBLIC LANDS AND RESERVED WATERS

June 4, 1987

"Mr. Chairman, my name is John Titus. I am a council member of the Native Village of Venetie and it is a privilege and honor to speak on behalf of the people of Venetie. I was not aware of what was going to take place before coming to Washington.

I am married and have eight children, all of whom are addicted to caribou. We don't know and no one knows what will happen to caribou. Since the (TAPS) pipeline was put in, it had something to do with the migration of the porcupine caribou herd.

Venetie and Arctic Village chose to retain land rather than take part in the ANCSA structure because they wanted to retain their way of life. I don't need a written statement because caribou are my life. I don't need a counselor sitting beside me because caribou are myself.

I'm going to declare ware if anything happens to our caribou."

Senator MURKOWSKI. Thank you very much, Mr. Titus. Sarah James? It is a pleasure to have you before us, and we look forward to your testimony.

STATEMENT OF SARAH JAMES, ARCTIC VILLAGE, ALASKA

Ms. JAMES. Mr. Chairman, I would like to say a few words in my language.

[Whereupon, the witness proceeded to speak in her native tongue.]

I said, relatives, sisters, brothers, grandpas, grandmas, people, friends, chiefs, I used chief in our language because chief in our language means leaders. I said I am happy to be here. I came from a long way. I want you to listen to me and what I have to say.

I am a resident of Arctic Village and I am a village health aide. Arctic Village is located at the most remote, isolated, rural area of the nation. I said that because the location and the history is unique.

The location is 118 miles northeast of the Arctic Circle. The only transportation is by air. That is bush, small airplane. There is no waterway. There is no road. And to get a patient into the hospital will take about three hours, regardless of how much an emergency it is.

The land, which is very important to us, is our culture. It goes along with what we use every day, like caribou. And the government is important to us to, because it keeps us together and working together.

I have been a health aide since 1970, and I have not found any of my people low in iron. I did a study on nutrition, and they did a study on nutrition at Native Medical Center in Anchorage, Alaska.

For the record, you can find the information, because they deal with a lot of natives and they have to study nutrition. What the people eat in each village. It shows that caribou got the highest nutrition value.

And among the natives in Alaska, maybe across the nation, Indians have problems with suicide, diabetics, alcohol. In my village we do not have suicide problems.

And my village is ory. They do their drinking outside the village. I am not saying that we do not have alcohol problem, but we do not have alcohol problem in my village.

Crime. Between Venetie and Arctic Village we only have two crimes, just minor offenses that they built against them. It was not something worse than that.

I thought I should tell you all this because on this issue there are more questions than there are answers. I can give you answers. My people do not want any development of the Arctic Wildlife Refuge coastal area.

The whole area is a calving area. If there is one core calving area, we probably would have solved that problem a long time ago, because my people have used the caribou for centuries.

We probably would have it fenced by now, because if they go one place faithfully every year, then there will not be any problem or arguments over a calving area. But they do not.

The animal does not talk, they just go where their needs at the time. Like right now they said that there is a caribou calving right in the Canadian part of the country. That is not new to me because we are talking about the whole Arctic coastal area.

Another way that my village is unique is that, if people come up from here this summer, they will see it. We have artists, we have musicians, and I even brought some stuff from my village just to show that we do exist and we do use caribou.

I have pictures to prove it, I have got arts and crafts to prove it, because these people that are going to make a decision on this issue have never experienced the life we have there. And they are the ones that are going to make the decision for us.

I feel like I am being neglected, ignored. And only to get here I had to pass a hat around to about eight different organizations to get here. I feel like I am not being represented very well, and I have to get here one way or another to do that. I am mostly thankful for those people that put the money together to get us here.

The caribou itself, not only caribou but any kind of native food, that means tree squirrel, ground squirrel, fish, and all that, all kinds of different fish. We have got all kinds of different fish, within our area and up in the coastal area.

They said there are no predators up there. They tend to be camouflaged. They do not have vegetation to protect them. Like I said, native foods work wonders for us sometime.

Everybody knows this in my culture that when somebody is dying he is going to die anyway. I have an experience with a cancer patient where this guy is going to die anyway, and he is in a suffering stage. And he asked for this one native food, and we bring it to him.

And he ate that, and he sat up and talked and spoke just normal, and then he died. That is one of the stuff that we know in our culture, that native foods do that for us.

I am trying to make it short. I have got so many things I want to bring up. I do not want to quit talking. I grew up as a subsistence user. My parents grew up as a subsistence user.

My people believe in environmental issues, believe in environmental value of the things that surrounded them. How do you think they preserved the value for the last centuries or so?

It is because they valued the environmental. They think environmentally. So in making this decision, when it comes to this decision, they are likely to go for wilderness with an addition of subsistence provision.

They said that caribou increase in numbers. We do not say caribou until we see a stampede. So I can not say that it is overpopulated. My parents are not educated in a Western way, but they are educated in the Indian way. We respect our Indian way of living.

I will go through the history a little bit. Our refuge is not abundant with wild animals as our ancestors have described to us. The caribou increase in number because since it became an Arctic Wildlife Refuge, there was protection on it.

Before that there was trapping with poison, and they killed a lot of animals, from fish and bear or whatever, because they were using poison for bait.

At the time I said my family was living as a subsistence user, a lot of times we had to go without. Really, Alaska, for that type of history, I do not think that 90 percent of Alaska is wilderness, I mean it is not true.

So another thing we do is we do a caribou dance. And we imitate caribou, and moving across the country, and the way they eat. We do caribou dance. And this one pertains to culture and caribou, because this is a caribou skin hot dance, we do that.

Each time we change the pattern because the skin hot dance got the pattern to it, which way the door is. And each time you turn to the door you change the pattern. Each time we change the pattern we say, "Hee."

So with this I will close saying, "How, hee, ho."

[The prepared statement of Ms. James follows:]

TESTIMONY OF SARAH JAMES
NATIVE VILLAGE OF ARCTIC VILLAGE
before the
UNITED STATES SENATE ENERGY AND NATURAL RESOURCES
SUBCOMMITTEE ON PUBLIC LANDS AND RESERVED WATERS

June 4, 1987

"Mr. Chairman, my relatives, brothers and sisters, elders, people, friends, chiefs (leaders), I am happy to be here. I came from a long way. I want you to listen to what I have to say. (first spoken in my language, Gwitchin, then translated in English.)

My name is Sarah James. I am from Arctic Village, Alaska. Arctic Village is located in a remote, rural area.

I said this because it's located at a unique location 118 miles northeast of the Arctic Circle, whose only transportation is by small bush planes; no road, no waterway. It takes three house to get to a hospital, regardless of the situation.

Being a Village Health Aide, I study nutrition at the Alaska Native Medical Center, Anchorage, Alaska. Caribou has the highest nutrition value. They have to study Native food value because they deal with village people.

Language is important to use. We speak our language. English is our second language, our government system is different. Records show among the Natives in Alaska and here, too, I guess, the suicide, alcohol problems, diabetes is high, but we don't have that problem between Arctic Village and Venetie Health Aide since 1970. I never really had to deal with low iron deficiencies in Arctic Village. When some of you get up there, you will see we are talented, artistic and musical. Native food works wonders for use among the Natives. We know this when someone is dying, if he ask for certain Native food (I had experience with patient dying with cancer) we go obtain that food for him, after he eats it, would go back to normal without pain, he gets up happy and talking, then he die.

I am telling you all this because being here a few days this issue about Arctic National Wildlife Refuge, Arctic Coastal area. Seems like there are more questions than there are answers. If you ask me, my answer is no exploration/development for gas and oil in Arctic National Wildlife Refuge in 1002 Arctic Coastal area. In Arctic Village people are totally against development of gas and oil within the whole Arctic Coastal plain because caribou have calves there, for centuries they don't concentrate to one area which they use for calving, they use the whole area in various areas each year. If there is _____ calving area, we would have solved the problem already. All we had to do was fence them in and provide food for them during calving season. This animal just don't faithfully go to same place year after year. So there is no alternative but leave them alone, let nature take its course.

I feel like I ignored of my existence, I feel like I was not represented very well. We ask for hearing in Arctic Village to express our concern because we cannot afford to go where they set up hearings, but got no response. We got here, I found a lot of Congressional people not aware of our existence and concerns. The people that will make decision if Arctic Coastal plain should open up for exploration and development of gas and oil or not. I brought some arts and crafts and material made with caribou skin and so forth just to prove we do use caribou every day of our life.

In order to get here, I am losing working time (leave without pay) because I already used up my annual and sick leave time doing this type of work to represent my people. I have passed the hat among eight different organizations to make collection enough for the fare.

If caribou is increase, it's no number to where they stampede like they did in the past, that's when we talk about caribou that tell us that its number is down, that's why we are not excited until we see stampede.

I grew up as a subsistence user. My parents grew up as subsistence life. My parents are not educated in western way, but they are well educated in Indian way of life, which makes them highly intelligent of what is going on around them.

My people believe in environmental value, believes in preserving environmental value. How do you think they preserve environmental value for the last century or so. After the non-Indian came along, there is much damage and misuse of the land and living things and mistakes. Before that time, my ancestor, they are very cautious in preserving the environment. For example, wherever they went, they don't leave any trace behind. Up to today, my people still teach it as practiced it the best they know how because their life depend on it and for their children's future. They got environmental mind in order to survive. Subsistence practice is so close to it because we don't take more than we need. It's based on need. So land to be Wilderness designated with additional subsistence provision is more likely to be accepted.

The Arctic Refuge is not abundant with wildlife as our ancestors have described. The only reason caribou increase in size is because it happened after it was established as ANWR, when they stopped or limited use of the land. There are some animals that are not back in size yet, even after 17 years of ANWR. All the time my family lived as subsistence living between 1950-64, there's hardly any living things, so a lot of times we have to do without. We lost a lot of living things from birds to fish to flies, when one of the Great change came to us, when fur money was booming. They poisoned a lot of small and large animals, and they used poison for bait. That was way before 1950. So, it's finally regained its living things. Let's just give this land time to regain its living things before another Great change, like maybe never do it again. So, if you judge a land by the abundance of living things as the good health of a land. That 90% of Alaska is wilderness is not true.

We have Indian dance we greatly respect. We dance caribou dance. We imitate caribou movement in various patterns, noise and eating, we do other dance, caribou skin hut dance. To do this dance, we dance in circles in the pattern of support poles formation, we stop and go, we yell 'hee' of opening and closing the door to welcome you to our home. With this, I close saying How! Hee! Aho!

Thank you.

Senator MURKOWSKI. Thank you very much, Sarah James.

Let me ask the panel, if it could be assured to you by, I guess, biologists or scientists, that exploration would not have a detrimental impact on the caribou, because they tell us that the exploration would only occur in the wintertime, do you think that is adequate insurance, since the caribou are not there in the anticipated area of ANWR that would be leased?

Would you feel comfortable with that? Anybody can answer these.

Mr. TITUS. Senator, several years ago they had a seismograph that they had done in our area. They drilled some holes and then they used dynamite.

Directly or indirectly from that, we lost the ground squirrels, which are part of our food, and muskrat and beaver. It had a lot of effect on small animals.

Fur industry is our biggest resource in this area. And these little animals like that had a lot to do with bringing in more fur to our fur industry.

Senator MURKOWSKI. I am wondering if you thought about the growth of the caribou herd, the area around Prudhoe Bay, and I think you indicated that perhaps it was not as healthy as some of the other animals that are not part of that herd. Is that correct?

Mr. TITUS. I was not the one who said it, but I would like to comment on that. Wild animals and animals exposed to people are two different wildlife.

I always say that the animal around Prudhoe Bay, around the oil rig, I work around there, and I always call them Walt Disney animal. I do not go to zoo to kill what I am going to put on table for my children.

Senator MURKOWSKI. The Porcupine Herd that has gone through the Canadian Arctic in their migration have been subjected to, I assume, some activity from time to time in Canada.

So I would assume that they are not totally free from any observations of the impact of mankind in their migration. Is that not correct? We know that there has been extensive drilling in the Canadian Arctic, in the area on the Canadian side, and in the paths of the migrating Porcupine Herd.

Mr. TITUS. We could very well tell by the reaction of the animal whether they have been exposed to a human and also to the traffic. The wildlife, they have very sensitive feelings, and I think that we are pretty closely related to their feeling.

We can almost tell how the animal reacts, we immediately observe it, and know why they react that way. I am not a biologist or anything like that, so I can not very well put it on the table in an explanation way.

Senator MURKOWSKI. As I understand it, the witnesses that are testifying do not reside within the boundaries of the ANWR area. Arctic Village is just outside, Venetie is also outside it.

But the Porcupine Herd moves after calving into an area where you subsistence hunt for them, after the calving period. Is that not correct?

Mr. TITUS. Could you repeat that last word?

Senator MURKOWSKI. Well, I am looking at some maps here——

Mrs. JAMES. That is why we have got the map up there, to show that we are not within the Artic——

Senator MURKOWSKI. Arctic Village is just outside the Arctic National Wildlife Refuge.

Ms. JAMES. Yes.

Senator MURKOWSKI. Is that correct? But you depend on the movement of the caribou and you hunt within the area. You do not hunt on the coast, necessarily. Is that not correct?

Ms. JAMES. Yes.

Senator MURKOWSKI. And the same is true at Venetie. Is that not correct?

Ms. JAMES. We are mostly concerned if there was disturbance to the calving area or disturbance to the caribou movement. They might change their direction or change their pattern of where they go.

And if they are not reaching our village, then that is really, you know, we depend on that herd.

Senator MURKOWSKI. Yes. You know, obviously, people differ and we have had the testimony of Archie Brower of Kaktovik who, according to his introduction, has lived there for 30 years, and his recommendation that the ANWR be opened.

Reasonable people differ. I am wondering if you would care to comment on how some of the people represent, there are other people who suggest that we can open ANWR and safely have both caribou and exploration, and your opinion that it is not in the best interests of your people?

Mr. TRITT. You will have to remember that everybody else who testifies for exploration do not rely exclusively on caribou.

Senator MURKOWSKI. And in your case in Arctic Village that is your exclusive livelihood?

Mr. TRITT. That is right.

Ms. JAMES. Yes. In Venetie, that map shows there is a big circle, the big circle is for the users. But then the caribou do not migrate through all that big circle.

But then we circle that big circle because we trade among each other and share with the surrounding communities, because that is where caribou used to go when they were large in size. But they are not that large in size anymore. That is when they do their stampede.

Senator MURKOWSKI. Now, the statement was made that because of the activity, perhaps in Prudhoe Bay, the caribou have moved into Venetie, the implication being that there might not have been as much caribou activity there before.

Might not there be a reason that there is more caribou that would cause them to move into Venetie? And in any event, is that not better for the residents of Venetie?

Mr. TITUS. If the animal is being harassed to the point where they have got no other place to go, would you assume they would go to the place to get away from the harassment? And move into our area where we use them for subsistence rather than just doing it for sportsmanship?

Senator MURKOWSKI. It hardly points out the evidence that we have had in the Prudhoe Bay area where there is activity, there seems to be an increase in the caribou.

Ms. JAMES. We are talking about a whole different herd. We are talking about Porcupine Caribou Herd and the other one on the other side is the Central Herd. And they came to adapt to one small area, and I think they are smaller than our caribou in size anyway.

Mr. TITUS. Our concern is that they could very easily move into the Venetie area, but they could just as easily move out too.

Senator MURKOWSKI. I am sure that they have. Sarah James, you indicated that you were thankful to those who provided the capability for you to come down and testify. I am wondering if you would care, for the record, to indicate who that was or what organization that was?

Ms. JAMES. Yes. We went around and passed a hat around, like I said, and these are the people that came through. There is Venetie Tribal Governments, Arctic Village Council, Venetie Council, TCC, Sierra Club, and Wilderness Society and Friends of the Earth.

Senator MURKOWSKI. They gave you help on your transportation, financial help?

Ms. JAMES. Yes.

Senator MURKOWSKI. How much did they give you?

Ms. JAMES. Not very much, because we are not even, I mean we have to live with friends here, and pitch in with this and that. So just a ticket, a supersaver ticket.

Senator MURKOWSKI. Well, we all have to travel on that once in a while. I note that you are all members of the Tanana Chiefs. Is that not correct? The Tanana Chiefs Council?

Mr. TITUS. No. The Tanana Chiefs sponsor some of the programs in our village, and we are a government tribe on Venetie Indian Reservation.

Ms. JAMES. We only have contract with them under health service. And the rest is assistance through BIA.

Senator MURKOWSKI. No way should we assume that you are speaking for anybody but yourselves.

Ms. JAMES. No.

Senator MURKOWSKI. Certainly not the Tanana Chiefs Council.

Ms. JAMES. Yes. That is why I say we did the passing the hat around.

Mr. TITUS. We are one of the people that forego the claims too, so we have our own tribal government.

Senator MURKOWSKI. Have you had substantial state support in your village, Venetie, or Arctic Village? Say, from state in the state schools, other activities that the state has funded as a consequence of the revenue base of the state?

Mr. TITUS. Yes. The Yukon school district is part of our school. It is the only state revenue that I pictured in Venetie.

Senator MURKOWSKI. We have had some testimony by some of the spokesmen, representing their people, the mayor of the North Slope Borough and others, about the contribution that this revenue base makes to the livelihood of bush Alaska, and also brings alcohol abuse, drug exposure, and various other things that you used to not have to put up with.

So it is both good and bad. And I am wondering if you would equate having the ability to make a choice whether you would rather have not had the input of whatever revenues have come in as a result of the state being able to provide services?

Because this is part of the consideration that the governor spoke of when he said that the state budget was cut 50 percent, which means fewer services.

I guess while that is not just the concern of the Federal government, it is a concern of Alaskans, as to the importance of having continued revenues for the benefit of the people of the state, native, non-native, rural and urban.

Which would you rather have, if you had to make a choice?

Mr. TRITT. I was elected in January, and since then we have not been able to hire anybody or get anything done, basically, because people who are not qualified who are asking for outragous wages.

That is basically what has happened that all that money did to the people. It just spoiled them basically, and now it is hard for us to get any help without paying big money.

Senator MURKOWSKI. Any other comments on what the economic contribution has been vis a vis the fact that it is reducing very rapidly? And unless it is replaced, why, probably we can expect fewer services in the state, in bush Alaska as well as urban Alaska?

Ms. JAMES. I can see another solution. Alaska does have a lot of other resources, and it has been taken out and been sold back to us. And Alaska tends to depend on oil price, and the oil company tend to control the price, and what is going on with Alaska.

But my solution is that we should develop our own resource, and have our own refinery. I think we could do that and to be independent state. Even State of Idaho is independent state with their potatoes.

So I do not see how we can not do it, because we do have forests and fish and all kinds of minerals.

Senator MURKOWSKI. Well, I think that, as we know, what the governor is attempting to do is to broaden the economic base of the state.

I have no further questions of the panel. I want to thank you for your contribution. The fact that you have come a long distance. And I think your contribution to the record is significant.

I want to note at this time a statement of the Tanana Chiefs Conference, that it is appropriate to be entered into the record at this time.

[The statement referred to follows:]

Statement
# of the
Tanana Chiefs Conference, Inc.

on

Further Exploration and Oil Development
in the 1002 Area of the
Arctic National Wildlife Refuge

to the

United States Senate
Energy and National Resources
Subcommittee on Public Lands and Reserved Water

The Tanana Chiefs Conference is a regional Native nonprofit organization representing 43 Athabascan Indian communities in Interior Alaska. Among the villages we represent are Arctic Village and Venetie, communities that are heavily dependent, economically and nutritionally, upon the Porcupine caribou herd. We represent several other villages dependent upon that herd to a lesser extent. Tanana Chiefs appreciates the opportunity to comment on the further exploration and development in the 1002 area of the Arctic National Wildlife Refuge at this time.

The people in Arctic Village and Venetie are opposed to further exploration and development on the coastal plain of the refuge. The people in these villages feel certain that oil development will disrupt the Porcupine Caribou Herd in distribution and population significantly. The final resource assessment report itself concludes that major effects on the porcupine herd could result if the entire 1002 area were leased and developed. The Porcupine Caribou are the central food source for these subsistence based villages. There are no other local food sources to take the place of the caribou. Neither the draft nor the final coastal plain resource assessment clearly outline how critical the Porcupine Caribou are to the existence of those villages. As an environment impact statement, it fails to analyze the potential socioeconomic characteristics in Arctic Village and Venetie that may be significantly affected by the proposed action. The National Environmental Policy Act requires an analysis of the human environment impacted by major Federal actions. The potential impacts on Arctic Village and Venetie must be assessed in much greater detail.

Hearings were not held in these villages to illustrate the impacts that oil development could have on those villages. Section 810 of the Alaska National Interest Lands Act (ANILCA) calls for hearings should a determination of significant restriction on subsistence activity be made. However, section 810 only applies to Federal agencies and will not provide protections if hearings are carried out after a congressional decision to open the Coastal Plain to oil development occurs. Congress instituted section 810 to protect subsistence uses. If Congress decides to open the refuge to oil development the legislation itself must contain impact mitigation language specifically for Arctic Village, Venetie, and other villages that use the Porcupine Caribou herd. These people of Arctic Village and Venetie have potentially the most to loose of anyone. They gain no tax benefits being located outside of the organized borough in which development will occur and yet their main food source and base of the economy could be significantly damaged. These villages are not in a position to form a borough themselves. The full board of the Tanana Chiefs Conference adopted a resolution to oppose development in the refuge until hearings are held in the affected villages. A copy of that resolution is attached to this statement.

The entire Kwitchen Indian culture is based upon caribou. There are irreplaceable values potentially in jeopardy. The people of Arctic Village and Venetie want the decision makers in Congress to know how the congressional decision could affect them culturally and economically. A detailed socioeconomic analysis for those villages is needed as well as hearings in those villages.

Comparison is often made between Prudhoe Bay development with the Central Arctic Caribou herd and the potential development in the coastal plain with the Porcupine Caribou herd. This is a very misleading comparison. The Porcupine herd is 15 times larger and occupies its range 14 times more densely than the Central Arctic herd [Whitten and Cameron, 1985]. The Prudhoe Bay development did displace Central Arctic herd calving activity, although the area was never considered a concentrated calving area. Only a small portion of the calving grounds were developed and the Central Arctic herd has other suitable calving areas including the 1002 area of the refuge. The Central Arctic herd is not yet using their available habitat to capacity. The differences in the Central Arctic herd and Porcupine caribou herd are substantial. It is unscientific and inappropriate to repeat the rhetoric that development of Prudhoe Bay demonstrates compatibility of oil development with fish and wildlife resources and the needs of subsistence users on the whole North Slope.

The Porcupine Caribou have calved in the 1002 area of the refuge every year since observations have been made (1972 to present). Up to half of the Central Arctic herd may calve there each summer as well. Nearly 40% of the concentrated calving area could be affected according to the final resource assessment. Use of 29-52 percent of the insect relief habitats could be substantially reduced according to the report as well. Both displacement from the most suitable calving and insect relief lands to less desirable lands will significantly weaken the herd and alter its distribution. As the resource assessment states, "all biologists participating in the Fish and Wildlife service workshop agreed that displacement from areas of human activity related to oil and gas activities would occur".

A change in distribution of the herd, shifting generally to the east for example, could result in up to a 100% loss of the animals to subsistence hunters in Arctic Village and Venetie. Yet, the Environmental Impact Statement fails to discuss at all, the socioeconomic effects oil development in the Coastal Plan could have on Arctic Village and Venetie.

There are many conclusions in the resource assessment that reasonably indicate that the Porcupine caribou herd will change its distribution patterns and suffer some decline in population. Among some of those conclusions are:

pg. 165 "Losses in Fish and Wildlife and wildlife resource, subsistence uses and wilderness values on the 1002 area would be the consequence of a long-term commitment to oil and gas development in the area."

pg. 139 Reductions in fish and wildlife populations, displacement of fish and wildlife from areas of traditional harvest and reduced access to those resources will adversely affect subsistence uses."

pg. 123 "Major effects on the Porcupine Caribou herd could result if the entire 1002 area were leased and all oil prospects contained economically recoverable oil."

pg. 124 "A change in distribution of the Porcupine Caribou herd could reasonably be expected."

pg. 125 "... loss of important habitat has been shown to have major negative effects on ungulates [i.e., caribou]."

pg. 140 "Residents of Arctic Village, Alaska and Old Crow, Fort McPherson, and Aklavik, Canada could experience some reduced subsistence harvest as a result of potential effects on Porcupine Caribou distributions or possible population declines."

and so forth.

At the full board meeting of 43 Tanana Chiefs Conference villages in March of 1987, a resolution was adopted requesting impact funds appropriated through lease sales specifically for an appropriate substitute food production program in Arctic Village and Venetie. Such a program may include buffalo, muskox, or moose husbandry programs. Any program must provide for the future generation as the damage to the herd could be longstanding or irreversible. The resolution further requests impact aid for the Tanana Chiefs region for mitigation of adverse impacts through land and resource use planning and, for employment training and placement services. A copy of this resolution is attached to this statement.

The Tanana Chiefs Conference concludes that the Porcupine Caribou herd distribution patterns would be altered and the population would likely decline should oil development occur on the coastal plain, even with known mitigation techniques in place. In conclusion, (1) a detailed socioeconomic study of Arctic Village and Venetie is lacking, (2) hearings must be held in these affected communities, and (3) if Congress decides to open the area for further oil exploration and development impact aid must be granted specifically for Arctic Village, Venetie and the Tanana Chiefs region to ensure the survival of those villages dependent upon the herd.

TANANA CHIEFS CONFERENCE, INC.
Board of Directors

Resolution No. 87-64

Support Village Hearings Re: Opening ANWR to Oil Exploration

WHEREAS, the Tanana Chiefs Conference is a tribal organization authorized by the tribal governments of the villages in the TCC region; and

WHEREAS, opening the Arctic National Wildlife Refuge in Alaska is not in the best interest of the member villages without having hearings in the affected villages of Alaska and Canada; and

WHEREAS, there has been only one hearing held at a location which permitted access to the decision making process by rural Alaskans; and

WHEREAS, this issue directly affects the cultural and subsistence lifestyles of rural Alaskans and Canadians;

NOW THEREFORE BE IT RESOLVED that the Tanana Chiefs Conference Board of Directors opposes the opening of the Arctic National Wildlife Refuge until proper hearings have been held in Alaska; and

BE IT FURTHER RESOLVED that the report to Congress be delayed until the hearings are held in all the affected villages and can be incorporated into the report.

CERTIFICATION

I hereby certify that this resolution was duly passed by the Tanana Chiefs Conference, Inc. Board of Directors on March 19, 1987 at Fairbanks, Alaska and a quorum was duly established.

Daisy Northway
Secretary-Treasurer
Tanana Chiefs Conference, Inc.

Submitted by: Yukon Flats
& Youth Delegates

TANANA CHIEFS CONFERENCE, INC.
Board of Directors

Resolution No. 87-65

Arctic National Wildlife Refuge (ANWR)

WHEREAS, the villages of Arctic Village and Venetie in the Tanana Chiefs region, as well as the Canadian Village of Old Crow are extremely dependent upon the population and distribution of the Porcupine Caribou herd as a matter of economics, nutrition, and cultural heritage; and

WHEREAS, the Porcupine Caribou herd contributes a majority of the nutritional requirements of Arctic Village, Venetie, and Old Crow and a significant economic contribution to several other Tanana Chiefs villages; and

WHEREAS, current governmental reports indicate that the Porcupine Caribou herd could suffer as much as a 40% population declines and/or change in migration paths due to oil and gas exploration and development in the Arctic National Wildlife Refuge (ANWR); and

WHEREAS, other Tanana Chiefs communities would be impacted by increased traffic in the Utility Corridor should such development were to occur; and

WHEREAS, exploitation of rural resources should accrue to the benefit of rural citizens,

NOW THEREFORE BE IT RESOLVED that the Tanana Chiefs Conference directs the TCC to advocate on behalf of the consideration for the maximum protection for the Porcupine Caribou calving and habitat areas within the ANWR in conjunction with any oil and gas exploration development in the ANWR;

AND BE IT FURTHER RESOLVED that should development occur, that the villages of Arctic Village, Venetie, and Old Crow receive impact funds for an appropriate substitute food production program to meet the needs of the future as well as the present in a manner which will enable the village to be as self-sufficient in food production as presently possible;

AND BE IT FURTHER RESOLVED that should development occur, hiring practices for exploration and development include 100% Alaskan hire with a Native preference;

AND BE IT FURTHER RESOLVED that the Tanana Chiefs Conference shall seek impact aid for the TCC region and its villages for mitigation of adverse impacts through land and resource use planning and, for employment training and placement services.

CERTIFICATION

I hereby certify that this resolution was duly passed by the Tanana Chiefs Conference, Inc. Board of Directors on March 19, 1987 at Fairbanks, Alaska and a quorum was duly established.

Sherry P Dows for:
Daisy Northway
Secretary-Treasurer
Tanana Chiefs Conference, Inc.

Submitted by: Yukon Flats

TANANA CHIEFS CONFERENCE, INC.
Board of Directors

Letter of Intent to Accompany
Tanana Chiefs Conference, Inc. Board of
Directors Resolution #87-65
Arctic National Wildlife Refuge (ANWR)

It is clear that the Villages of Arctic Villages, Venetie, and Old Crow could experience a multi-generation taking of subsistence hunting of caribou with the exploration and development of oil and gas in the Arctic National Wildlife Refuge (ANWR). Such development would result in the planned destruction of up to an estimated 40% of the Porcupine Caribou herd.[1] If the herd altered its migration path as much as 40% it could mean up to a 100% reduction in available animals to those villages. Each one of those villages is heavily economically dependent upon the Porcupine Caribou herd for its nutritional and cultural requirements. To a lesser degree, the Villages of Fort Yukon and Chalkyitsik are economically tied to the herd as well. In contrast, the Village of Kaktovik has used the Central Arctic herd for the past 4-5 years and at varying times before that as well. The Arctic Coastal plain villages have available sea life and North Slope Borough tax base to supplement their needs. Arctic Village, Venetie, and Old Crow do not have alternative local resources, and the proposed development would not occur in a manner which would enhance any tax base available to these villages, so that these villages will not benefit from development as has the North Slope communities. These villages would be in an extremely desperate economic-nutritional situation without the Porcupine Caribou herd.

Should development occur in ANWR, compensation must be made to affected villages out of the proceeds from the lease sales in ANWR. These funds could be put into a trust fund for an appropriate substitute food production program. Such a program may include buffalo, muskox, or moose husbandry programs. Any program must provide for the future generation and not only the present as the damage to the herd could be long-standing or irreversible.

Exploration and development, if and whenever it may occur, must be done in the most environmentally protective manner possible even if such development methods are more expensive. Any exploration or development of the ANWR oil and gas resources will be at the expense of the Porcupine Caribou herd. The herd would not calve in and utilize that ecological niche without a sound ecological reason. The water quality in the development area will also be endangered triggering a variety of impacts in the food chain upon which the village depends.

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[1] The 40% figure is taken from the draft "Arctic National Wildlife Refuge Coastal Plain Resource Assessment", more commonly known as the "1002 Report".

Other villages in the Tanana Chiefs region will be affected by increased traffic in the Utility Corridor. Villagers farther away will be impacted as any other State citizen as decision makers regarding the easiest and best use of non-renewable resources.

If oil and gas exploration and/or oil and gas exploration is allowed to occur in ANWR, the Tanana Chiefs Conference will seek impact aid for the region for land and resource use planning and for employment training and placement services. With development of the field all of the TCC villages would be affected, some severely and others less so. This regional impact aid will Mitigate these impacts and will allow local benefit for this development.

Senator MURKOWSKI. I note the recommendation of the board of directors that if oil and gas exploration is allowed to occur, the Tanana Chiefs will seek impact aid for the region for land and resource use planning, employment training and placement services.

I think that that and other matters still pending will appropriately come before the Committee, and the recognition that the record is still open for what, 10 days, two weeks?

And on behalf of the Chairman, Senator Bennett Johnston of Louisiana, I conclude this portion of the oversight hearings, the second oversight hearing.

We will have the third oversight hearing Thursday, next week, and that will be the enviromental panel. Then Friday we will have the fourth, last scheduled oversight, which will be various industry groups.

That concludes our hearing for today, and I want to thank all the witnesses.

[Whereupon, at 12:55 p.m. the hearing recessed, to reconvene Thursday, June 11, 1987.]

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

THURSDAY, JUNE 11, 1987

U.S. Senate,
Committee on Energy and Natural Resources,
Washington, DC.

The committee met, pursuant to notice, at 9:30 a.m., in room SD-366, Dirksen Senate Office Building, Hon. J. Bennett Johnston, chairman, presiding.

OPENING STATEMENT OF HON. J. BENNETT JOHNSTON, A U.S. SENATOR FROM THE STATE OF LOUISIANA

The Chairman. The hearing will come to order. This morning is the third of our oversight hearings the Committee has scheduled on the Secretary's report to the Congress regarding oil and gas leasing on the Coastal Plain of the Arctic National Wildlife Refuge in Alaska.

Today we are going to hear testimony from organizations, from five environmental groups. We will conclude this first round of hearings tomorrow when the views of several oil and gas industry representatives will be heard.

The hearing record will remain open for two weeks to receive additional views and materials regarding the Secretary's report.

I am pleased to welcome the panel this morning, which will begin with Mr. Tim Mahoney, Washington representative of the Sierra Club and chairman of the Alaska Coalition of Washington D.C.

They will be testifying as a panel. There is also a, I am not sure how you pronounce this, Gaylord Nelson. [Laughter.]

The Chairman. Counselor for the Wilderness Society. Jay Hair, president of the National Wildlife Federation. Brock Evans, vice president for national issues of the National Audubon Society. And Randy Rogers, executive director of the Northern Alaska Environmental Center from Fairbanks, Alaska.

Gentlemen, welcome to the panel. Please proceed in whatever order you would like. I suppose Mr. Mahoney, since he is first on the list.

STATEMENT OF TIM MAHONEY, WASHINGTON REPRESENTATIVE, SIERRA CLUB, AND CHAIRMAN, ALASKA COALITION

Mr. Mahoney. Thank you, Mr. Chairman. I am Tim Mahoney, Washington representative of the Sierra Club.

And since January of 1987 I have been chairman of the Alaska Coalition, a group of, at the moment, 18 groups, which was formed in the 1970s to work on the Alaska Lands Act itself, and then went into a period of hibernation after 1980 and has been reactivated to work for protection of the Arctic Wildlife Refuge Coastal Plain.

I will not read you all the members of the coalition, but it includes some of the organizations on the panel today, such as the Wilderness Society and the Northern Alaska Environmental Center. And then a broad range of national and regional environmental groups, ranging from the Audubon Society of Fairbanks to the Garden Club of America.

I do not have the direct experience that some of the panelists here have on the Arctic Coastal Plain. I will be making my first visit to the area this summer, along with a great number of House Members and Senators.

I am looking forward to it. I certainly have become quite a student on the issue, however, trying to represent the views of all of our member groups.

We want to make the point, from the Alaska Coalition's perspective, that we are not dealing primarily with a conflict of oil and wildlife. We believe that we are dealing with a wilderness conflict.

The Arctic Refuge is a wilderness refuge. It was identified as a great wilderness resource back in the 1930s. There were proposals in the 1950s to make it a park. I am told that the Park Service rejected the idea because it was so remote.

And efforts were made to make it a part of the wildlife refuge system, which occurred originally in 1960 under proclamation by President Eisenhower.

So it predates a lot of the other areas that were in the Alaska Lands Act, even though the Alaska Lands Act designated substantial portions of the refuge as wilderness and added about 10 million acres to it.

Today it remains the one true wilderness on Alaska's North Slope. Even the prosaic draft report by the Department of Interior uses some pretty powerful language to describe it.

The Arctic Refuge, it says, is the only conservation system unit, the only one, that protects in an undisturbed condition a complete spectrum of the various Arctic ecosystems in North America.

And the Coastal Plain itself, according to the Department of Interior, is the place that is used by most of the spectacular Arctic species of animals for important portions of their life stages.

And then it goes on to say that the 1002 area, the Coastal Plain, is the most biologically productive part of the Arctic Refuge, and it is the center for wildlife activity, and that the caribou themselves are an unparalleled spectacle, because of the density of their numbers.

I do not know how some of these expressions, the only, the most, unparalleled, got through the political reviewers at the Department of Interior. I do not think they made it into the final draft.

But they are published. And they are true. In some ways the very spectacular nature of the wildlife makes it a bit of a public relations problem for the Alaska Coalition. Because unlike the wilderness areas that we view as so important elsewhere in the country, this one is remarkable precisely because of its wildlife.

It has got spectacular scenery. It has got varied landforms. It has got solitude. It has got recreational opportunities. It has got all the things that make it an important wilderness.

But what makes it distinctive is it has wildlife in abundance that groups like the Sierra Club think must have been like what it was like to see buffalo roaming on the Great Plains 100 years ago.

We do not have free-roaming wildlife herds that are living in wilderness ecosystems everywhere on this continent. And this is the greatest one.

I thought the best thing that I had read about this was from a book called, Arctic Wild, which was by a couple who studied the area before it was designated as a refuge. And the quote that I liked is, that this was a great wilderness, not just a wilderness, but a great wilderness.

And the quote is, "Great wilderness has two characteristics: remoteness and the presence of wild animals in something like pristine variety and numbers. Remoteness cannot be imitated in cheap materials. And wilderness without animals is mere scenery."

Well, Sierra Club might not say that about a lot of important wildernesses. But that is what makes this a particularly wonderous place.

And the public relations part is because the oil companies and their public relations department have done a pretty good job of saying, well, if we want to talk about animals, let us talk about game management.

Let us forget about the concept of wilderness, as if it is okay to destroy the wilderness, so long as we can keep some of the animal populations alive, or some of the animals in numbers approximating their original numbers.

We have been asked, how many caribou do we need? As if we are asked how many caribou can we afford. And what we have said is, we need one herd in its wilderness setting, with its predators, with its associated species. And that is what we are down to. We are down to one herd in the wilderness setting.

We have also compared the fight over the Arctic Wildlife Refuge to the proposals debated in Congress 20, 25 years ago over damming the Grand Canyon. And I would like to go over that a bit.

The idea of damming the Grand Canyon for its vast hydroelectric potential was not a discussion about a 19 percent chance of finding energy reserves.

The public power interests, the hydropower interests, the bureaucracies in the Department of Interior who advocated building those dams knew that if they built a dam there was a 100 percent chance they would get energy.

Not 19 percent. They knew the energy would be long-lasting, like hydroelectric reserves are. They knew it was close by to the power systems of southern California. It did not have to travel through a pipeline. It did not have to be loaded on to ships and taken to ports.

And it was cleaner in many ways than developing oil reserves. And like the oil companies today, they tried to portray this, not as a black and white issue, but as one of shades of gray. The dam was outside the park. The reservoir would not fill the canyon like a bathtub. You would still have a pretty good view.

I could have used other examples. This Committee in the last 6 years has debated whether to develop the geothermal resources of Island Park, Idaho, which we suspect but do not know are connected to the geothermal resources of Yellowstone National Park.

Yellowstone National Park is a great geothermal energy reserve. But we do not think about it that way. And we have decided that developing Island Park, Idaho is not a good idea, because we do not know what the effects would be on Yellowstone.

In World War II, we debated whether to cut down the old growth forests of the Olympic National Park in Washington for national security reasons. We have never had greater national security needs in World War II, we chose not to do it.

There are two important differences between the Grand Canyon analogy and the Arctic analogy. First of all, most Americans know about the Grand Canyon. A lot have visited it, and even those who have not know what it looks like, they have seen pictures, they have an idea of its grandeur.

Most people do not yet know about the Arctic. But when we first designated Grand Canyon, or Yellowstone, they were not well-known either.

And the second is more subtle. Americans could visualize the conflict between energy and nature in Grand Canyon National Park because they can visualize a reservoir and what it would to to Grand Canyon.

It is a lot harder to visualize the impacts of a series of pipelines, wells, crews, the exploration activities, and what they do to what makes Arctic special, which is its abundant wildlife.

But we believe that the overlap is as great as a reservoir in Grand Canyon, and from what we are able to understand from the experts, the results would be as catastrophic.

Certainly the department's vision of development in a narrow space, between the mountains and the sea, 20 miles to 30 miles space, 100 mile range, they are talking about 100 miles of main pipeline bisecting the area, 380 miles of roads, seven large production facilities, four smaller facilities, four airfields, two ports, salt water treatment facilities, 40 million to 50 million cubic yards of gravel to be excavated and moved around.

This is a big industrial facility that would cover the Coastal Plain end to end, because the places that the Department of Interior has projected as the best plays, as they call it, are at each end of the Coastal Plain and right in the middle.

We have also heard, exploration, exploration is not development. Exploration occurs in the winter. To kind of give you an impression that we are like, putting a hypodermic needle into the tundra.

We are not. Two things that the Environmental Protection Agency cited in their letter, their very critical letter to Assistant Secretary Horn, which said that the EIS that the department prepared was inadequate and should be done over, was that two very mundane items are in very short supply.

Water and gravel. You use water for all of the temporary structures that are only meant to last one winter. They spray fresh water and they build ice structures for airfields, for roads, for supports for the drilling rigs themselves.

And if they need multi-winter structures for the main facilities, for the main wells, for the main roads, then they have got to get gravel. Well, the Draft Environmental Impact Statement said, this is a major engineering problem because we do not have supplies of either material.

The area is very close, it is very narrow. The rivers that come down from the mountains are short. They are not like the vast plains at Prudhoe, or even in the National Petroleum Reserve, and they do not really know where they would get that water.

They have talked about building de-salinization plants on the coast. But what we have heard is that they would really be talking about building dams. Water diversion projects. Dredging out reservoirs. Trying to build up bodies of water.

And, they would not do that in the winter. That has to happen in the summer. And it makes very major impacts on the landscape. And of course, the gravel, you do not see the gravel on the tundra.

The gravel is on the beaches, on the riverbanks, in the mountains, the excavation whether you call it burrow pits or quarries, or as we have been calling it, strip mining, is vast.

Whether or not they ever find a drop of oil, the Department of Interior says the odds on not finding any commercial oil is 8 in 10. Eighty-one percent.

Other witnesses will speak today about the imbalance in the energy program of this administration. And that more attention to conservation initiatives could probably save this country as much oil as we might find, if we had the 1 in 5 chance of finding energy in the Arctic.

But I would point out that this Committee and the House has considered this issue in the midst of the OPEC oil embargo, in the midst of the Iranian hostage crisis, and at a time when our gasoline prices were sky high.

And we fought, and the House passed wilderness legislation for this area. And the Carter Administration, unlike the Reagan Administration, backed wilderness protection for this area as part of what it perceived as a balanced energy program that stressed production in some places, conservation, alternative fuels. This area merited under that administration's view protection.

Just to return to the Grand Canyon analogy. Because this country chose not to dam the Grand Canyon, probably the greatest available hydro site left on the Colorado River, does not mean that we did not dam the Colorado River.

We dam it upstream, we dam it downstream. The water does not even reach the Gulf of California most of the time. And that river works. Likewise, the North Slope of Alaska works.

We have given what has turned out to be the most productive oilfields, as part of the statehood selections, to the State of Alaska. We have transferred the Naval Petroleum Reserve to the Department of Interior, and then in the fiscal year 1981 appropriations bill, opened that for leasing.

We have opened the Beaufort Sea for leasing, as we have opened off-shore areas all over Alaska. This is an 1,100 mile coastland. All 1,100 miles are in a leasing program off-shore, by the Federal government, by the state government.

All 1,100 miles on-shore are being devoted, through state law or Federal law, to petroleum exploration and development, except one place. This place. And this place has values of its own, which we believe that wise public policy, a balanced use of our lands on the North Slope, would be to designate this area as wilderness. Thank you.

[The prepared statement of Mr. Mahoney follows:]

STATEMENT OF
TIM MAHONEY
WASHINGTON REPRESENTATIVE, SIERRA CLUB
AND CHAIRMAN
ALASKA COALITION
BEFORE THE
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
CONCERNING THE ARCTIC NATIONAL WILDLIFE REFUGE

June 11, 1987

Mr. Chairman, members of the Committee:

I am Tim Mahoney. I am a Washington Representative of Sierra Club, a national environmental organization of more than 400,000 members. In January, 1987, I was elected chairman of the Alaska Coalition, an alliance of organizations in Alaska and across America which worked to protect Alaska's national interest lands in the Alaska National Interest Lands Conservation Act (ANILCA) and which was reactivated to work for protection of the Arctic National Wildlife Refuge coastal plain. The eighteen member groups of the Coalition are: Alaska Center for the Environment, American Littoral Society, American Rivers Conservation Council, Appalachian Mountain Club, Arctic Audubon Society, Defenders of Wildlife, Denali Citizen's Council, Environmental Policy Institute, Friends of the Earth, Garden Club of America, National Parks and Conservation Association, Natural Resources Defense Council, Northern

Alaska Environmental Center, Rivers Unlimited, Sierra Club, Southeast Alaska Conservation Council, Trustees for Alaska, and The Wilderness Society.

I wish I could speak with the direct experience of some of the other witnesses here today. Like some of the members of this Committee, I will be making my first visit to the coastal plain in August. But I have become quite a student and an advocate for the Arctic recently, and I speak for the hundreds of thousands of members of all of our organizations, some of whom are experts, all who care deeply.

Wilderness

The decision over whether or not to develop the Arctic coastal plain is one concerning wilderness--not wildlife.

The Arctic Wildlife Refuge is our second largest refuge, perhaps our wildest. Proposals to preserve it date from the 1930's. Conservationists attempted to formally protect it first as a park in the 1950's, then as a refuge and succeeded in part when President Eisenhower proclaimed the 9-million-acre Arctic Wildlife Range in 1960.

Ironically, conservationists seeking to preserve one portion of Alaska's north slope with abundant wildlife were encouraged to look to the northeast corner of the state since geologists earlier in the century were convinced that the greatest petroleum potential lay in northwestern Alaska which was designated a Naval Petroleum Reserve. (It was transferred to the Department of Interior in 1976 as National Petroleum Reserve-Alaska (NPR-A)).

The National Park Service studied the area in 1953 but decided it was too remote to be a national park, hence its current management by the Fish and Wildlife Service.

Today, it remains the one true wilderness on Alaska's north slope. In the 1980 Alaska Lands Act, Congress formally designated wilderness for the remainder of President Eisenhower's withdrawal outside of the Coastal plain in 1980 and added another 10 million acres to the range, redesignating it as Arctic National Wildlife Refuge.

Even the prosaic draft 1002 report states, "The Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America." Let me stress the word only. This is a unique place, not a collection of animals, but a place.

But the coastal plain portion of the refuge, while a portion of the whole, has its own special attributes. As the draft states, "The coastal plain in its present state has outstanding wilderness qualities: scenic vistas, varied wildlife, excellent opportunities for solitude, recreational challenges, and scientific and historic values."

That sounds as if it could apply to many places in Alaska but the report points out what makes the place special. "Most of the major wildlife species occurring on the refuge (caribou, moose, brown bears, wolverines, wolves, muskoxen, polar bears, and numerous species of birds) use 1002 area habitats for all or part of their life cycles (calving, nesting, breeding, staging). The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is center of wildlife activity on the refuge. Caribou migrating to and from the 1002 area and the postcalving caribou aggregation offer an unparalleled spectacle. The area represents many opportunities for scientific study of a relatively undisturbed ecosystem."

Consider the words that have escaped the political censors at the Department of Interior: "the only conservation system unit;" "the complete spectrum of ecosystems;" "the most biologically productive;" the "center of wildlife activity;" "unparalleled spectacle."

First, we have narrowed our wilderness opportunities on America's Arctic Ocean coastal plain to just one place because every other place has been devoted--by federal or state law--to petroleum exploration and development. But the only place left is exceptional; it is the best wilderness.

This presents a bit of a public relations dilemma for a group like the Alaska Coalition. What makes this possibly the continent's greatest wilderness are its productive and complete ecosystems and the sheer variety and abundance of its wildlife: the polar bears, the muskoxen, the wolves, wolverines, the millions of birds. And most distinctive of all, its caribou herd, the last free roaming arctic herd not yet subjected to petroleum exploration and development.

Conservation organizations work on many important wilderness areas, but there is none like the Arctic Refuge. And there is no wilderness within the refuge quite like the coastal plain. Perhaps the best explanation of its significance comes from the book, Arctic Wild, by Lois Crisler, who lived in and explored the area before it was designated a refuge.

> This was the first 'great' wilderness I had ever been in. Yet all our married life we had lived in 'wilderness,' first in the Olympics in Washington State and then in the Colorado Rockies. But it was captive wilderness. This was free. It sounds obvious but is known to few: free wilderness gives you the experience of freedom. I could not know freedom consciously yet, though I felt it. It is a vital experience totally different from anything experienced in civilization; it has to grow on you. A starving child does not instantly experience bounding health after one good meal.

> Great wilderness has two characteristics: remoteness, and the presence of wild animals in something like pristine variety and numbers. Remoteness cannot be imitated in cheap materials; and wilderness without animals is mere scenery.

The oil company publicists have tried to take the remarkable wildlife for which this area is famous and turn the issue into one of game management. And in discussing all of the impacts on wildlife populations which the Department of Interior in its draft report stated could happen--the loss of 40% of the caribou, of half of the muskoxen, half or more of the wolverines, unknown impacts on the polar bears, loss of one quarter of the snow geese--the list goes on and on and the cumulative effects of pulling first one strand out of the web, then another, are unguessable. But even we can forget, in the arguments between scientists, that we are talking about our last wild place; it is really the undisturbed wilderness habitat that makes it special for wildlife, not the other way around.

The subtle pitch from the oil companies and from the Department is, "It's all right to destroy wilderness--of course, the wilderness is destroyed--so long as the animals aren't extinguished. And the track record at Prudhoe is that except for predators, we've managed to keep animals alive."

We have been asked: "How many North Slope caribou do we need?" I guess the questioner is really asking, "How many caribou can we afford?" Our answer is, "one herd." We ask that in one place, we have a large healthy herd of animals living in its wilderness with its ecosystem intact. Other caribou in other places may survive. Their predators and associated species may or may not survive--but it will not be because we as a people have decided that there is a specific place for them on Alaska's Arctic coast. It will be because they survived the development that is our principal public and corporate policy everywhere else on America's Arctic coast.

We have compared the proposal to develop the Arctic coastal plain with the idea--debated in Congress twenty-five years ago--of flooding the Grand Canyon, for its enormous hydroelectric potential.

This was no 19% chance of finding energy reserves. Here the odds on attaining hydropower are 100%; build the dam, turn on the generators. And hydro lasts a long, long time. It's not the same finite reserve as an oil field, no matter what its size. Of course, it's cleaner than petroleum processing and it's closer. Needing no pipeline, Grand Canyon is immediately accessible to the Southern California power grid.

The power companies behind that proposal tried not to portray it as a black and white choice--the dam would be outside the park, not in it--only the reservoir would back up inside. And of course, the canyon wouldn't be completely flooded. We'd still get a view--just a different view.

I've used the Grand Canyon for dramatic effect, but it's not the only choice between resource development and protection--not mitigation--of natural values. The choice was the same at Hell's Canyon National Recreation Area--hydro or wilderness--where the canyon is now a Forest Service wilderness. This Committee has in the course of the last six years debated geothermal leasing amendments and particularly geothermal energy development at Island Park, Idaho, next to Yellowstone National Park; not inside the park but suspected of being connected through the underground plumbing to the geysers at Yellowstone. And in World War II, policy makers seriously debated logging the magnificent old growth forests at Olympic National Park--for national security production reasons.

There are two important differences between the Grand Canyon analogy and the Arctic. First, more Americans know about the Grand

Canyon. Many have visited it, and most have seen pictures of the unusual scenery. Second, Americans can easily visualize the impacts of a reservoir on the Grand Canyon. It's a stark decision. We really would not debate mitigation or compromise--you don't build half a dam.

Arctic is less well known--now--just as places such as Grand Canyon, Yellowstone, or Olympic were once known to only a few. And the imagery that the oil companies and the Department have put forward--exploration, few impacted areas, Prudhoe Bay stipulations, wildlife mitigation--are more complicated and hard to visualize than a reservoir and a canyon. But the impacts are real and complete.

Development

The coastal plain is a narrow strip of land between the mountains and the sea--not like the wider plains of Prudhoe in the Central Arctic or the NPR-A in the west.

The areas proposed for exploration and potential development by the Department range across the full 100-mile length of the plain. Three separate drilling areas are linked by haul roads that bisect the area. Under the full leasing option, we are talking about a massive industrial complex from east to west: 100 miles of main pipeline, 380 miles of roads, collecter lines, seven large production facilities and four smaller ones, four airfields, two ports with salt water treatment facilities, and 40 to 50 million cubic yards of gravel to be dug up and moved.

Of course, if the area were leased, different companies might choose different strategies for development; certainly they would attempt the most cost-effective methods and the development might vary. Under the proposal of the Department, we are being asked to turn this narrow, vital, unique and last wilderness into an industrial complex.

While exploration has not produced economically viable finds in the NPR-A, there is an ongoing leasing program in the Beaufort Sea by the federal government outside the three-mile limit and by the state inside the three-mile limit.

Significant onshore discoveries have been made on the state lands of the central Arctic but being in private hands, development decisions are not public decisions.

I have attached to my testimony information on these existing fields and their status, taken from an Institute of Social and Economic Research study by the University of Alaska, Anchorage, dated May, 1987.

Exploration

We have been told that exploration is not as harmful as development, although Congress is not being asked to arrange for exploration of the area. It is being asked to lease the area, with full rights for development going to private interests.

But even if there is not a commercially recoverable drop of oil--and the Department admits that the odds on this are 4 in 5, 81%, and higher if the price of oil stays lower than $33 per barrel--the impacts could be severe and long-lasting.

Consider the two mundane building materials for exploration: fresh water and gravel. Water is used to build ice structures that are temporary--used in the winter--such as drill pads, roads, airfields, and foundations for camps. The Department's draft "1002" report acknowledges the Arctic coastal plain--unlike Prudhoe or NPR-A--lacks adequate fresh water and calls this "a major engineering problem."

The area receives little snow or rain, has few lakes and its rivers are short, the mountains being so close to the sea. The report does not bother to consider the environmental impacts of obtaining the 15 million gallons needed per well or the millions more needed for temporary roads, airstrips, and camps. The Department suggests coastal de-salinization plants or "innovative methods."

We are told that the most likely innovative method would involve building dams on the rivers, diverting the waters into reservoirs which might need to be scoured out to make them deep. While there are animals present at the rivers in wintertime as well as summer, this construction will have to take place in summer and will radically affect the land.

According to the Department, "multi-winter" drilling and "permanent" roads, airstrips, and facilities must be built with gravel--35,000 cubic yards per well. But there is no gravel on the surface of the tundra--gravel must come from the rivers also, or the beaches, or the mountains, in quarries, borrow pits, strip mines.

Even if no oil were found, these exploration activities would go forward in all of the lease areas, and the Department shows the "play" ranging across the entire plain.

EPA, in its critical comments contained in its June 1 letter, laconically states: "Significant shortages are acknowledged but the final LEIS has not presented an adequate analysis to show whether water quantity/gravel quantity are sufficient to support the recommended action. The final LEIS assumes that major adverse effects can be handled in a manner which will not result in adverse impacts to water quality or habitat."

Energy

Development proposals for the Arctic have been considered by Congress before. When the U.S. was last in the vise of the OPEC oil embargo and the Iranian hostage crisis, the House passed wilderness legislation for the area.

The Carter Administration strongly supported the designation of the coastal plain as wilderness at a time when our nation was considering legislation for the OCS leasing program, the Synfuels Corporation, the Energy Mobilization Board, and the Clinch River Breeder Reactor. Sierra Club did not agree with every aspect of the Carter energy program, but we recognized it attempted balance, seeking enhanced production, conservation, and alternative energy sources.

Today this Administration says that we risk a future energy crisis, a claim most environmental organizations would not dispute. But its proposals for grappling with that crisis are half-hearted and one-sided. This Administration recommends opening new areas to development, while relaxing conservation. This is a policy David Brower refers to as "strength through exhaustion."

Recent testimony by Christopher Flavin of the Worldwatch Institute contrasts this approach with conservation.

> Recent experience and numerous analytical studies show clearly that improved energy efficiency is the fastest and least expensive means of reducing dependence on foreign oil. The energy efficiency of the U.S. energy economy has improved by a staggering 24 percent since 1973, saving the equivalent of 4 billion barrels of oil in 1987 alone, or 11 million barrels per day. This is 38 times the potential annual contribution from ANWR, and many studies indicate that energy efficiency's contribution could be doubled to the equivalent of more than 20 million barrels of oil per day by the year 2000....

> There are a range of energy efficiency programs that Congress and the Administration could enact to meet comparable or far greater oil needs than can be met by developing ANWR. The single largest potential is in transportation -- which now uses about two-thirds of U.S. oil. The efficiency of the U.S. automobile fleet now averages about 18 miles per gallon, and continues to increase slowly as more efficient cars developed in the early eighties replace the less efficient ones on the road. However, the Administration has slowed down this progress by relaxing new car standards from 27.5 miles per gallon as mandated by Congress to just 26 miles per gallon. Other countries, particularly Japan, continue to make progress on the automotive efficiency front, and the U.S. still has one of the world's least efficient automobile fleets.
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> A one mile per gallon improvement in U.S. automobile fleet efficiency saves about 5 billion gallons of gasoline each year or about 130 million barrels of oil. A more ambitious plan to improve efficiency by 10 miles per gallon could reduce oil use by 3.5 million barrels of oil per day or four times the ANWR contribution. Moreover, an improvement in automobile efficiency will save oil indefinitely, whereas ANWR is projected to have a limited 30-year lifespan. As automotive technologies are further improved in the future, additional oil can be saved in this way. Current technologies already made 40-mile per gallon cars economical, and so, given a national commitment to lower oil consumption, these savings can be pretty well guaranteed, an interesting contrast to the 19 percent chance of finding exploitable oil in ANWR. Raising the fleet efficiency to this level by the year 2000 would just about compensate for the entire 6.5 million barrels per day of lost production now projected.

To return to our Grand Canyon analogy, this country chose not to dam and thus destroy a natural wonder--the Grand Canyon--that might be our greatest undeveloped hydroelectric resource. But that is not to say that we did not dam the Colorado River. Upstream and downstream, throughout its thousand-mile length, the once mighty Colorado has been dammed and harnessed for energy and agriculture so that the water no longer reaches the Gulf of California. But we not only left one dam site alone, we preserved it, in recognition of its splendor.

We have already listened to the petroleum interests again and again in Arctic Alaska. First, with the state selections of the central Arctic, then with the exploration of the National Petroleum Reserve, then with the OCS leasing programs in the Beaufort Sea, the entire 1100-mile coastline offshore and onshore has been devoted to energy to explore and develop if possible--except one place--the best place for wilderness and wildlife. Like the Grand Canyon, its natural values are known and world class. One the other hand, its energy values are highly speculative. We believe that the unbiased evidence shows that the destruction of this magnificent wilderness would follow exploration. We believe that one place should be set aside--one place on Alaska's north slope should be protected. This place, the last one.

Thank you for this opportunity to present our views.

4. EFFECT OF THE EXPORT BAN ON ALASKA CRUDE-OIL PRODUCTION

4.1 STATUS OF NORTH SLOPE PRODUCING PROPERTIES AND PROSPECTS

4.1.1 PRUDHOE BAY. The Prudhoe Bay field, which was discovered in 1968, is the largest oil-producing property in North America. The main Sadlerochit reservoir originally had an estimated 23 billion barrels of oil in place, of which about 11 billion are considered recoverable by primary, waterflood and miscible-gas-recovery technologies. Production from this reservoir has been nearly steady at 1.5 million barrels per day ("mmb/d") since 1979, but all three major producing companies expect output to drop off rapidly beginning in late 1988 or early 1989. Average production in 1991 could be as low as 1.1 mmb/d.[1]

ARCO Alaska, Inc. is operator for the eastern area of the Prudhoe Bay unit and Standard Alaska Production Company (formerly Sohio) operates the western area. As of the end of 1986 the producers had invested $12-13 billion at Prudhoe Bay.

Prudhoe Bay was initially developed using 640-acre spacing for wells that commenced production at up to 20 mb/d each. Infill drilling at a spacing of 160 acres commenced shortly after production began in 1977; an 80-acre-spacing program commenced in 1981 and continues today. Further infill drilling over the next few years will result in well spacing at 40-acre intervals and recover an additional 80-100 million barrels. In 1986 a typical Prudhoe Bay well, with an average measured depth of 10,500 feet, cost about $2.4 million. By the end of 1986, 835 wells had been drilled and an additional 350 wells are currently planned for full field development.

To help maintain production rates, a $2-billion waterflood project began operating in 1984. The waterflood project will increase recovery by about 1 billion barrels. An $800-million natural-gas-liquids EOR ("miscible gas") project began operation in December 1986. The project will process 50 mb/d of natural-gas liquids ("NGLs") to be blended into the crude-oil stream in TAPS and, will eventually result in added recovery of 135 to 190 million barrels of oil, as well as 365 million barrels of NGLs.

Other Prudhoe Bay owners are Exxon Company, U.S.A., Amerada Hess, Chevron U.S.A., Louisiana Land & Exploration Company, Marathon Oil Company, Mobil Oil Corporation, Phillips Petroleum Company, Getty Oil Company (Texaco), Shell and British Petroleum.

4.1.2 EILEEN PROSPECT. The Eileen Field, also called West End because of its location at the west end of the Prudhoe Bay unit, involves the same Sadlerochit formation that contains the main Prudhoe Bay reservoir, and will be operated by Standard as part of the Prudhoe Bay unit. However, in the Eileen sector the reservoir is composed of carbonates, and has to be drilled separately because of its stratigraphic separation. The Eileen sector is said to have million barrels of oil in

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place with about 150 million barrels of recoverable reserves. When developed, production from the field is expected to peak at 60-70 mb/d.

In 1985 when Standard announced plans to develop the Eileen field, the company estimated that the total field development cost would be about $300 million --- roughly $100 million for facilities and $200 million for the 72-well drilling program. Through 1986 the companies had spent $50 million on the project. Pipe for a 15-mile line to connect Eileen to a Prudhoe Bay processing center and well-line materials are in storage on the North Slope and the drill pads themselves have been completed. However, the uncertain oil-price outlook led the owners to suspend completion the Eileen project in December 1986. The gas-injection compressor, which will arrive on the 1987 sealift, will be stored on the North Slope; current planning is for a resumption of development in connection with an anticipated 1988 startup.

4.1.3 KUPARUK RIVER. The Kuparuk River field, centered onshore about 40 miles west of Prudhoe Bay, contains the second-largest producing oil reservoir in North America. Kuparuk, operated by Arco Alaska, Inc., is estimated to have about 5 billion barrels of oil in place, of which 1.5 billion are believed recoverable with primary and existing waterflood technology. Production, which began in 1981, reached a peak of 310 mb/d in January 1987. At the end of 1986 cumulative field-development costs were about $2.8 billion and full field development was expected to total $4 billion. Kuparuk production is expected to fall below 100 mb/d by the mid-1990s.

A field-wide waterflood project and a third production facility were added in 1986. However, in 1986, because of falling oil prices, Arco reduced the number of drilling rigs in Kuparuk from four to one. Initial production rates from Kuparuk wells ranged from 200 to 2,000 barrels per day. Since Kuparuk is a solution-gas-drive reservoir, rates will decline such that the average over the life of the field will be toward the low end of this spectrum.

At the end of 1986 a total of five hundred wells, with an average depth of about 6,000 ft. had been drilled in Kuparuk. In 1986 the typical Kuparuk well cost $1.5 million. Full development of Kuparuk will require more than 700 wells.

Other Kuparuk owners are Standard Alaska Production Company, BP Alaska Exploration, Inc., Mobil Oil Corporation, Chevron U.S.A., Inc, Union Oil Company of California, and Exxon Company, U.S.A.

4.1.4 MILNE POINT. Milne Point, operated by Conoco, Inc., is the smallest field on the North Slope yet brought into production, and the first field on which production has been interrupted because of low oil prices. The field, located about about 35 miles northwest of Prudhoe Bay encompasses upland and submerged tracts and is part of the Kuparuk River Cretaceous sands reservoir formation. The Milne Point unit has about 180 million barrels in place in the Kuparuk formation and about 1.6 billion in place in the Cretaceous sands formation. An estimated 60 million barrels are recoverable from the Kuparuk in the Milne field using primary and existing waterflood recovery technology.

An additional 40 million barrels could be recovered using tertiary and more advanced recovery techniques from the Cretaceous sands within the Milne field.

Production began in November 1985 and Conoco anticipated that 1986 production would reach 30 mb/d. From the start of production 45,000 b/d of water was injected into the Milne Point reservoir to maintain pressure and maximize recovery. Thus Milne became the first North Slope field to employ a secondary recovery technique during initial production. However, because of problems with the reservoir, peak production reached only 24 mb/d.

In February 1986, because of falling oil prices, Conoco suspended drilling operations at Milne Point. Milne Point production was shut down in January 1987, but is being maintained in a "warm" shutdown mode so that production could be resumed almost immediately if oil prices rose. By the end of 1986 Conoco had invested $471 million in the project. When Milne Point production was shut down the field had 34 production and injection wells, averaging 9,000 feet in depth. Drilling costs have averaged $2 million per well.

In its "warm" shutdown, Conoco is incurring $1 million per month in operating costs, nearly what the company would spend if the field were in production. Although low oil prices are the primary reason for the shutdown, other factors are that Conoco is not a TAPS owner and Milne is assessed a higher royalty than other North Slope producing fields. Conoco has indicated that lifting the export ban on ANS crude would provide a strong incentive for resuming production from the Milne Point field.

If production resumed, but no additional field development occurred, only about 15-20 million barrels would be produced from the field. However, Conoco indicated that an additional capital expenditure of about $35 million would allow production of the field's 60 million barrel reserve. No estimates are available regarding the cost of producing the Cretaceous pay in Milne, but would likely be more than double what has been spent at Milne to date.

Other Milne Point partners are Chevron U.S.A., Inc. and Cities Service Oil & Gas Corp.

While the Milne Point unit is rather small as North Slope producing properties go, its economically marginal status makes it better than the huge and prolific Prudhoe Bay and Kuparuk units, as an illustration of the development problems and production prospects for new fields in the Arctic.

4.1.5 LISBURNE. The Lisburne field, operated by Arco Alaska, Inc., includes onshore and offshore areas within the Prudhoe Bay Unit. The field underlies the the Prudhoe Bay producing formation and extends under Prudhoe Bay (the body of water). The field has an estimated 2.7 billion barrels of oil in place, exclusive of outlying portions of the field that are not expected to become economic. An estimated 250-300 million barrels are now considered recoverable under primary depletion supplemented by gas injection recovery technology. Waterflood recovery technology will probably eventually provided added production, but no confident estimate of total volumes can be made prior to the accumulation of operating experience in the field.

Lisburne production began in December 1986 at an initial rate of 35 mb/d from 25 producing wells drilled to an average depth of 11,000 feet. Field production is expected to peak in the mid-1990s at 80-100 mb/d. As of December 1986 Lisburne field development costs totalled $780 million including $210 million for production and injection wells.

Lisburne development involves the construction of one offshore and five onshore drillsites which will accommodate a total of 192 wells. The offshore drillsite, which includes a gravel causeway to shore, will be designed for 24 production wells and eight gas-injection wells. Oil will be transported nine miles from the Lisburne Production Center to TAPS Pump Station One via a 16-inch pipeline.

When Lisburne production began in December 1986, cumulative project development costs were just under $1 billion. Well costs, the biggest component of Lisburne's long-term capital cost have been reduced from about $5 million to $3.5 million apiece, but owing to the much greater depth (14,000 ft. vs. 8,500 ft. at Prudhoe Bay), these wells are still much more costly than the average Prudhoe Bay production well. Full development is expected to cost on the order of $1.5 billion.

The offshore site has been delayed until at least 1990 pending completion of an environmental impact statment ("EIS") by the Army Corps of Engineers regarding the causeway. The offshore wells are needed to allow the most efficient drainage of the reservoir. Infill drilling is anticipated on 160-acre well spacing in the 1990's. Full field development will require 180 gas-injection and production wells.

Lisburne is a difficult reservoir to produce because it lies in an older geologic formation composed of limestone/dolomite, a rock that is less porous than the sandstone of the Prudhoe Bay and Kuparuk formations. Lisburne is the first reservoirs of this type to be developed in Alaska.

Exxon Company, U.S.A and Standard Alaska Production Company are partners in the Lisburne field.

4.1.6 ENDICOTT. The Endicott field, which is expected to begin production in late 1987, will be the first commercial production from the U.S. side of the Beaufort Sea. The field, centered about 15 miles northeast of the main Prudhoe Bay operating facilities, borders the eastern side of the Prudhoe Bay Unit. Endicott, operated by Standard Alaska Production Company, will be the third largest producing field in Alaska.

The Endicott field, which encompasses about 42,200 acres, has an estimated 1 billion barrels of oil in place with 350 million barrels recoverable from primary and existing waterflood technology. Production is expected to peak at 100 mb/d in 1988-1992.

The project development includes two man-made gravel islands about 2.5 miles off the coast of the Sagavanirktok River delta in water depths ranging from 8 to 10 feet. The islands are interconnected and connected to shore by a gravel causeway. The 45-acre main production island is the largest island ever built in the Beaufort Sea. Initial production from Endicott will be from 32 to 34 wells drilled to an average depth of 10,400 ft. Initial production from Endicott wells is expected to be 3 to 5 mb/d, but this rate will fall off quickly. Full field development will require 100 wells.

The Endicott project has had the most dramatic drop in development costs of any North Slope field. Preliminary scoping of the project in the early 1980's estimated that field development would cost $3.8 billion. This approach was rejected as uneconomic. After substantial revisions, the owners allocated $2 billion for full field development of Endicott.

By the time oil prices began to plummet, Endicott module fabrication and island construction were well under way. Lower oil prices forced project planners to increase their cost cutting and efficiency efforts, but the biggest price break came from lower prices for module construction, gravel, tubular steel, and the like. Thus to date the primary impact of falling oil prices on Endicott has been that the field will be developed for a little more than half the authorized amount. The full field production costs are expected to be $1.14 billion: $550 million for facilities, $50 million for pipelines, $130 million for islands and causeways and $410 million for wells. By the end of 1987 all but $285 million of the $1.14 billion will have been expended with most of the remaining cost allocated for additional wells.

Falling oil prices caused a reduction in development drilling activity in the Prudhoe Bay, Kuparuk, Lisburne and Milne Point fields. There was no decrease in Endicott drilling because the two rigs, which had been specially built for Endicott field requirements, had long term contracts with high cost cancellation penalties. A significant difference between Endicott and Prudhoe Bay is that primary and secondary recovery capabilities will be part of the production facilities at Endicott from the outset. As a result waterflood, low pressure separation, gas reinjection and gas lift can be initiated at Endicott without additional capital expenditures.

Other partners in the Endicott Field are Amoco Production Co., Arco Alaska, Inc., Exxon Corp., Union Oil Co. of California, Doyon Ltd., Cook Inlet Region, Inc., and NANA Regional Corp. Inc.

4.1.7 WEST SAK. The 250-square-mile West Sak field, which is operated by Arco Alaska, Inc., is onshore and overlies a large portion of the Kuparuk River oil field. The reservoir, which has an estimated 15-to-40 billion barrels of oil in place, may turn out to be the largest accumulation of oil in the United States. However, using the technology so far developed in Arco's pilot project, State geologists estimate only about 750 million barrels to be recoverable. It is in order to note (1) that both the amount of oil in place and the ultimate production potential of West Sak and associated accumulations of heavy oil in the Cretaceous zone on the North Slope are highly controversial, indeed emotion-laden, issues among industry geologists and engineers, and (2) that we have yet to find any such authority who is willing to make an estimate for attribution. In the light of California experience with gigantic heavy-oil deposits, however (see Section 5), there is a good chance that estimates of ultimately recoverable volumes will expand dramatically in the future. (More than one highly authoritative individual privately speculated about oil-in-place volumes "on the order" of 100 billion barrels; another, however, was vehement that "none of that stuff will be commercial in our lifetime.")

West Sak oil is a thick, molasses-like, low-grade crude. The reservoir is composed of unconsolidated mushy sand that tries to flow into the well bore when substantial flow rates are attempted. The West Sak field is at a shallower depth which is closer to an overlying 1,800 foot-thick layer of permafrost and has a reservoir temperature of about 70 degrees F., compared to 140° for the Sadlerochit.

To date the only development in West Sak has been a two-year pilot project that involved eight production wells and five water-injection wells and one water-source well in an area about one-half mile square. The production and injection wells were drilled to a depth of 4,000 feet. Water for the injection wells was heated and reinjected under high pressure into the West Sak formation. For the pilot project the producing wells, which were located less than 500 feet apart.

If West Sak proceeds to full development, the producing wells would probably be located on areas ranging from 20 to 40 acres, with injection wells located between them. Full development of West Sak with the established technology would require up to five thousand closely spaced production and injection wells.

In 1984 Arco had estimated that the West Sak could be in full production by the late 1980's; however, the company suspended work on the West Sak pilot project in December 1986. Arco is still evaluating the pilot project results and undertaking substantial research to determine how the reservoir can eventually be economical to produce.

The other West Sak pilot participants are BP, Standard, and Exxon.

4.1.8 SEAL ISLAND. In June 1984 Shell Oil Company announced that a second well at the Seal Island prospect in the Beaufort Sea confirmed that the discovery was a commercial one (at early 1984 oil prices) that could lead to the recovery of 300 million barrels of oil. The announcement represented the first commercial discovery in OCS waters on the U.S. side of the Beaufort Sea. The wells were drilled from a man-made gravel island in 39 feet of water about five miles off the coast, 12 miles from the northern edge of the Prudhoe Bay field. Initially Shell indicated that production could begin as early as 1992, however it is unlikely that production will begin before the early or late 1990s.

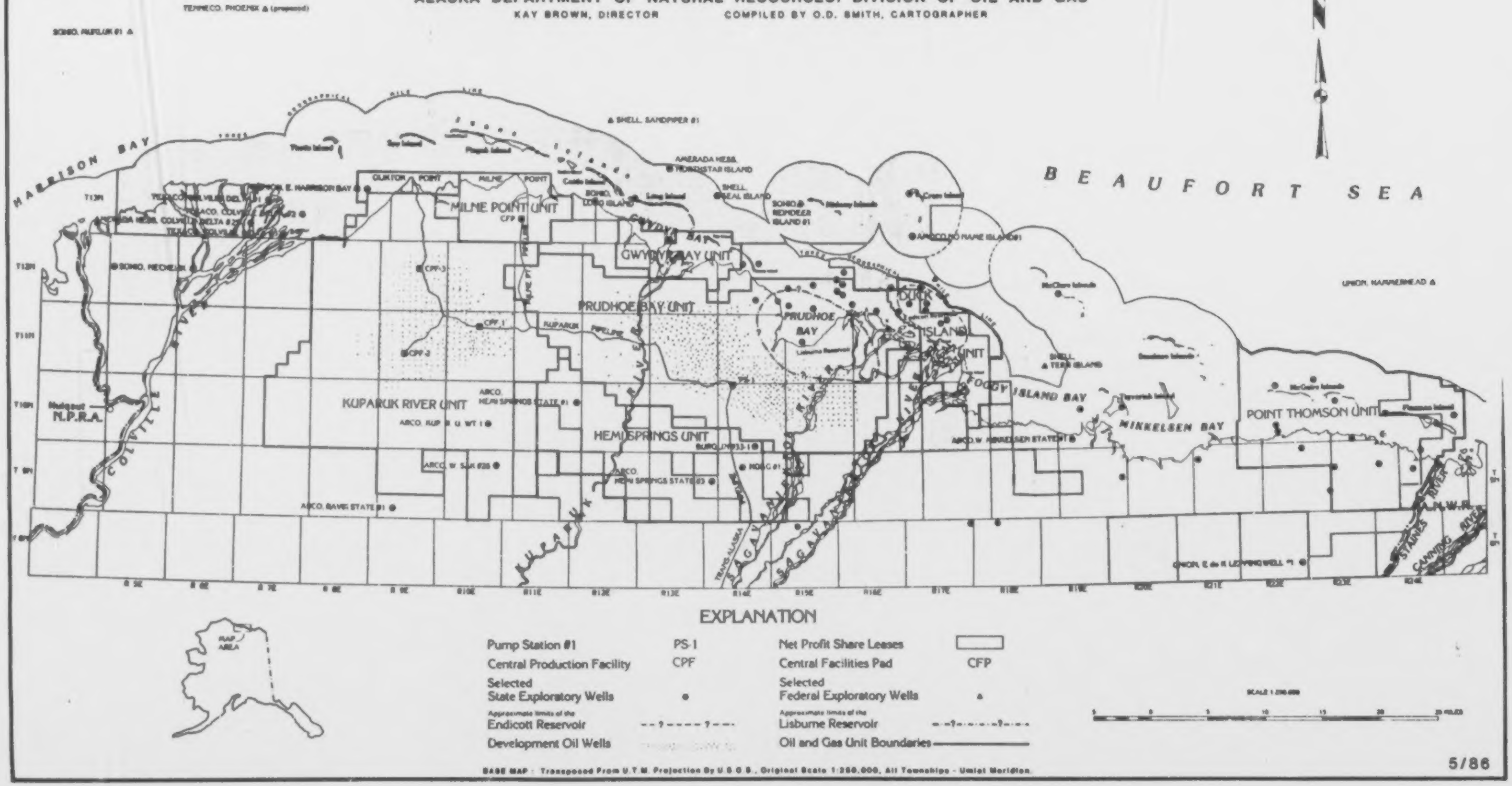
Drilling at Seal Island began in June 1983. The first well flowed at a rate between .6 and 5 mb/d and the second well tested at a stabilized rate of 5 mb/d. Oil was found in the Sadlerochit formation at depths below 12,750 feet. Oil from Seal Island is rated at 40 degrees gravity, lighter than the 26-to-27-degree oil produced at Prudhoe. Lighter weight oil sells for a higher price because it is a higher quality oil which is easier and less costly to refine into gasoline and jet fuel than Prudhoe Bay crude. A third well was drilled from Seal Island on a

Texas Eastern lease block to a depth of 14,490 feet and tested at up to 2.6 mb/d. The fourth well, on an Amoco lease, which was drilled to a depth of 16,200 ft., was plugged and abandoned without testing. Shell and partners paid $122 million for eight blocks in the Seal Island prospect, spent $33.2 million on gravel island construction and $86 million more to drill and test four wells.

In January 1986 Amerada Hess Corporation drilled a third well into the Seal Island prospect from a well located on Northstar Island which is 19,000 ft. northwest of the Seal Island discovery well. The Amerada Hess well flowed at rates of as much as 4.7 mb/d at a depth near 12,000 ft. This strike extended Shell's Seal Island discovery about 5 miles west. The Northstar operation may increase reserve estimates in the Seal Island area. Amerada Hess cancelled plans for further drilling when oil prices plunged. Shell's partners in the Seal Island prospect are Amerada Hess Corp, Amoco Production Co., Texas Eastern Exploration Co., and Murphy Oil U.S.A.

NORTH SLOPE UNIT MAP

ALASKA DEPARTMENT OF NATURAL RESOURCES, DIVISION OF OIL AND GAS
KAY BROWN, DIRECTOR   COMPILED BY O.D. SMITH, CARTOGRAPHER


TENNECO, PHOENIX ▲ (proposed)
SOHIO, FIREFLUK #1 ▲
N
BEAUFORT SEA
HARRISON BAY
▲ SHELL, SANDPIPER #1
AMERADA HESS, NORTHSTAR ISLAND
SHELL, SEAL ISLAND
SOHIO, REINDEER ISLAND #1
ARCO NO NAME ISLAND #1
UNION, HAMMERHEAD ▲
OLIKTOK POINT
MILNE POINT
MILNE POINT UNIT
CFP
GWYDYR BAY
GWYDYR BAY UNIT
PRUDHOE BAY UNIT
PRUDHOE BAY
KUPARUK
CPF-1
CPF-2
CPF-3
PS-1
KUPARUK RIVER UNIT
ARCO, HEMI SPRINGS STATE #1
ARCO KUP R U WT 1
HEMI SPRINGS UNIT
ARCO, HEMI SPRINGS STATE #3
ARCO, W SAK #25
ARCO, RAVIK STATE #1
SOHIO, NECHELIK
N.P.R.A.
COLVILLE RIVER
KUPARUK
SAGAVANIRKTOK
TRANS-ALASKA
DUCK ISLAND UNIT
FOGGY ISLAND BAY
SHELL, TERN ISLAND
MIKKELSEN BAY
ARCO W MIKKELSEN STATE #1
POINT THOMSON UNIT
UNION, E de K LEFFINGWELL #1
STAINES RIVER
CANNING RIVER
A.N.W.R.
T13N
T12N
T11N
T10N
T9N
R9E
R10E
R11E
R12E
R13E
R14E
R15E
R16E
R17E
R18E
R19E
R20E
R21E
R22E
R23E
R24E
MAP AREA
EXPLANATION
Pump Station #1 PS-1
Central Production Facility CPF
Selected State Exploratory Wells ●
Approximate limits of the Endicott Reservoir --?-----?---
Development Oil Wells
Net Profit Share Leases ▭
Central Facilities Pad CFP
Selected Federal Exploratory Wells ▲
Approximate limits of the Lisburne Reservoir -.-?-.-.-.-?-.-.-
Oil and Gas Unit Boundaries
SCALE 1:250,000
5 0 5 10 15 20 25 MILES

BASE MAP: Transposed From U.T.M. Projection By U.S.G.S., Original Scale 1:250,000, All Townships - Umiat Meridian.

5/86

The **Chairman**. Thank you very much, Mr. Mahoney. That was a really excellent statement.

Next, Senator Gaylord Nelson. Gaylord, welcome back.

STATEMENT OF HON. GAYLORD NELSON, COUNSELOR, THE WILDERNESS SOCIETY

Senator **Nelson**. Mr. Chairman and Members of the Committee, I have a supplementary statement analyzing the 1002 report, which I would like to have printed in the record after my statement.

Mr. Chairman, there has been a great deal of statistical speculation about what the chance is of finding oil on the 1002 area, how much it might be, and so forth. Now, however interesting this number speculation may be, I do not think it is particularly relevant to the critical issue Congress has to decide.

Whether the 1002 Coastal Plain contains some or a lot of oil, the issue remains just the same. It is this. Should we under any set of reasonable ballpark assumptions about the oil potential of 1002 compromise the integrity of this rare ecosystem in order to extract it?

Those who say, yes, claim the national security is at risk, and it is urgent we move promptly to protect ourselves against all kinds of dire circumstances. If indeed the security of the nation turns on finding a supply of oil equivalent to one of the optimistic scenarios described in the 1002 report, then the battle has already been lost.

This, of course, is pure nonsense. Six years ago Interior Secretary Watt used the same national security argument to justify his proposal to open the designated wilderness areas in the lower 48 for gas and oil leasing.

Congress did not buy his argument, and three times passed riders on appropriation bills to prohibit leasing. This year Interior Secretary Hodel is back with Jim Watt's national security argument again.

One is entitled to wonder about this administration's genuine concern over energy security, when it is noted that it has no long term energy conservation plan, no long term alternative energy policy, vigorously opposed legislation to increase the energy efficiency of appliances, and rolled back the mandated automobile mileage standard from 27.5 to 26 miles.

For purposes of addressing the pending issue that Congress must decide, let us assume that there is a world class oil deposit of 3 billion barrels in 1002. Over the 25 year life of the oil deposit, that would represent an average of about 2 percent of our current annual consumption of oil.

If Congress were to mandate, as it surely should, that the fleet average of all new household vehicles shall be 30 miles per gallon starting in 1993, that would save 8 billion barrels of oil by 2025, the projected life of any significant oil find in 1002.

Ironically, the 27.5 mile fleet average, instead of the administration's 26 miles, would save 3.2 billion barrels during the same period. If a 6 billion barrel deposit were found, that would still be 2 billion barrels less than the 8 billion that could be saved by a 30 mile fleet average during the life of the oilfield, and of course the savings would continue after the field was exhausted.

A 35 mile fleet average would save several billion additional barrels. The technology for achieving these savings in automobile consumption is already here, in place, and being used.

Doing something decisive, and effective, about energy conservation, especially automobiles, involves some difficult political decisions. But they will look easy compared to the choices we will face if we continue to procrastinate.

A policy that continues primary emphasis on digging up a little more fragile land for a little more oil is not a substitute for a sound, long-range energy program. And in fact will perpetuate our increasing dependence on foreign oil.

Pretending to address the energy issue by drilling in the Coastal Plain of the Arctic National Wildlife Refuge would be at the same time an act of self-delusion and a tragic degradation of a unique world resource.

Whatever oil may be found, it will not, it will not resolve or significantly affect any perceived national security problem. It will only further deplete that dwindling supply of the planet's rarest commodity, a complete and balanced ecosystem unaltered by human activity.

Not a single designated wilderness in the lower 48 can be accurately so described. Even the Interior Department Draft Assessment 1002 states that, "The Arctic Refuge is the only conservation system unit that protects in an undisturbed condition a complete spectrum of the various Arctic ecosystems in North America."

It further states that this area is the "most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge."

In 1977 the U.S. Fish and Wildlife Service successfully opposed the routing of the gas pipeline across the Arctic National Wildlife range, which I think Senator Stevens did too at the time, stating that such a crossing is clearly not compatible with the basic purpose of the range.

"Such activity would destroy wilderness values," the Fish and Wildlife Service continues, "and irretrievably disrupt many wildlife populations and their habitats. This Arctic range is the last unspoiled area of its kind in the entire northern hemisphere."

That says it all. It is in fact literally the very last of its kind. Once compromised we will never, never again see on the planet a comparable Arctic ecosystem representing tens of thousands of years of nature's intricate evolving works unaffected by human activity.

Several years ago Joseph Wood Krutch made a telling observation pertinent to the issue before us. He said, "If people destroy something replaceable made by mankind, they are called vandals. If they destroy something irreplaceable made by God, they are called developers."

There are many landscapes, many wildlife habitats, many undisturbed natural areas far more valuable to mankind than any commodities that may be extracted from them. This Arctic Coastal Plain is such a place.

If it is not, then I know of no other. If fully developed, several thousand people will live and work on the Arctic Plain. Huge amounts of gravel will be mined and roads built for heavy equipment.

Millions of gallons of polluted and toxic water and drilling mud will be stored in fragile ponds and washed away into bird and fish habitats. All of these activities will have serious environmental consequences that cannot be predicted or measured.

To argue the proposition that these activities can go on for 25 years without major permanent adverse consequences would be challenged by every ecologist I know in this country.

Indeed, the Interior Department report itself states, "The existence of oil facilities and activities would eliminate the opportunity for further scientific study of an undisturbed ecosystem."

The question Congress must answer is this. Do we want to save this rare and remarkable ecosystem in its perfectly natural condition for its intrinsic, aesthetic, scientific and philosophic values, or do we want to compromise it for its transitory commercial values?

We can not have it both ways. We have literally thousands of examples of compromised and degraded ecosystems all across the nation. And almost none that are not. The choice should be clear and simple.

During the past 40 years as an observer, and sometime participant in the debates and conflicts over the issue of exploitation of commodities, from the public lands versus the preservation of natural habitats, the argument has always been the same.

Those who insist that all marketplace commodities should be exploited invariably argue that the economy or national security or both require it. They have won most of the arguments in the arena of public lands, and now almost all of them in the private sector.

The result is that very little natural America is left. We have colonized almost every nook and every niche. Nobody argues that we need not commercially utilize any of our commodity resources.

The question is, under what circumstances and guidelines should commodities be developed and under what circumstances should they not.

The tragedy is that a great deal of the environmental damage done to the nation in the name of the economy or national security has been unnecessary, economically costly to the nation, and degraded the quality of our lives.

Some 20 years I was beneficiary of the good fortune to serve on the Senate Interior Committee with one of the most distinguished and influential conservationists of our time, Senator Clinton Anderson of New Mexico, then chairman of the Interior Committee.

He was the most important moving force behind the Wilderness Act of 1964. A year before it passed he wrote an article for the July, 1963 issue of American Forests. What he wrote should be read, re-read and pondered by everyone concerned about our future.

He wrote—

> Conservation is to a democratic government by free men as the roots of a tree are to its leaves. We must be willing wisely to nurture and use our resources if we are going to keep visible the inner strengths of democracy.

For as we have and hold dear our practices of conservation, we say to the other peoples of the world that ours is not an exploitative society, solely materialistic in outlook. We take a positive position.

Conservation means we have faith that our way of life will go on and we are surely building for those we know will follow. There is a spiritual value to conservation and wilderness typifies this.

Wilderness is a demonstration of our people that we can put aside a portion of this which we have as a tribute to the Maker and say, this we will leave as we found it. Wilderness is an anchor to windward.

Knowing it is there we can also know that we are still a rich nation, tending our resources as we should, not a people in despair, searching every last nook and cranny of our land for a board of lumber, a barrel of oil, a blade of grass, or a tank of water.

I suggest that it is still not too late to save something rare and beautiful that cannot be priced in the marketplace.

[The prepared statement of Senator Nelson follows:]

THE WILDERNESS SOCIETY

STATEMENT OF GAYLORD NELSON, COUNSELOR OF THE WILDERNESS SOCIETY, BEFORE THE SENATE ENERGY AND NATURAL RESOURCES COMMITTEE, ON THE COASTAL PLAIN OF THE ARCTIC NATIONAL WILDLIFE REFUGE, JUNE 11, 1987

Everyone is familiar with the statistical speculation about the oil potential of the 1.5 million acre coastal plain of the Arctic National Wildlife Refuge. The 1002 Assessment states that there is a 19 percent chance that a 200-day oil supply might be found. If such discovery is made, then design models make further percentage predictions of how much oil might be produced at certain inflation rates and price assumptions. Under one scenario, if commercially producible oil is found the model predicts a 75% chance of finding 1.12 billion barrels of oil; a 50% chance of finding 2.21 billion barrels; a 25% chance of finding 4.24 billion barrels. None of these numbers mean very much. At best they are guesses based upon the careful weighing of a collection of imponderables. The last estimates of this kind that I recall were in the National Petroleum Reserve-Alaska report which concluded there was a 97 percent likelihood of finding producible oil. This field, located just west of Prudhoe Bay, was expected to contain three times as much oil as the current predictions for the Coastal Plain. The reality is this: 39 holes have been drilled, and each one has been dry. The oil industry is no longer bidding on leases for this field.

However interesting this numbers speculation may be it isn't particularly relevant to the critical issue Congress must decide. Whether the 1002 Coastal Plain contains some or a lot of oil the issue remains just the same. It is this. Should we, under any set of reasonable ball-park assumptions about the oil potential of 1002, compromise the integrity of this rare ecosystem in order to extract it?

Those who say yes claim the national security is at risk and it is urgent we move promptly to protect ourselves against all kinds of dire circumstances. If, indeed, the security of the nation turns on finding a supply of oil equivalent to one of the optimistic scenarios described in the 1002 report then the battle has already been lost. This, of course, is pure nonsense. Six years ago Interior Secretary Watt used that argument to justify his proposal to open designated wilderness areas for gas and oil leasing. Congress didn't buy his argument and three times passed riders on appropriation bills to prohibit leasing. This year Interior Secretary Hodel is back with Jim Watt's national security argument again.

One is entitled to wonder about this Administration's concern over energy security when it is noted that it has no long-term energy conservation plan, no long-term alternative energy policy, vigorously opposed legislation to increase the energy efficiency of appliances and rolled back the mandated automobile mileage standard from27.5 miles to 26.

In 1985 the Department of Energy stated that energy conservation "has proven to be the most expeditious way to reduce the need for new or imported energy resources; and in fact it now contributes more to balancing our national energy ledger than does any single fuel source." Yet just last month when DOE Secretary William Martin was asked by this committee about the Administration's ideas on conservation and renewable energy he stated the Administration has "no specific proposals to help those sectors at this time". So much for Administration worries about national security.

For purposes of addressing the pending issue that Congress must decide, let's assume that there is a world class oil deposit of 3 billion barrels in 1002. Over the 25-year life of the oil deposit that would represent an average of about 2 percent of our current annual consumption of oil.

If Congress were to mandate, as it surely should, that the fleet everage for all new household vehicles shall be 30 miles per gallon starting in 1993 that would save 8 billion barrels of oil by 2025, the projected life of any significant oil find in 1002. Ironically, a 27.5 mile fleet average instead of the Administration's 26 miles would save 3.2 billion barrels during the same period. If a 6 billion barrel deposit were found that would still be 2 billion barrels less than the 8 billion that could be saved by a 30-mile fleet average during the life of the oil field. And, of course, the savings would continue after the field was exhausted. A 35-mile fleet average would save several billion additional barrels.

The technology for achieving these savings in automobile consumption is already here, in place and being used.

Doing something decisive and effective about energy conservation, especially automobiles, involves some difficult political decisions but they will look easy compared to the choices we will face if we continue to procrastinate.

A policy that continues primary emphasis on digging up a little more fragile land for a little more oil is not a substitute for a sound long-range energy program and, in fact, will perpetuate our increasing dependence on foreign oil.

Pretending to address the energy issue by drilling in the Coastal Plain of the Arctic National Wildlife Refuge would be at the same time an act of self-delusion and a tragic degradation of a unique world resource. Whatever oil may be found it will not resolve or significantly affect any perceived national security problem. It will only further deplete that dwindling supply of the planet's rarest commodity -- a complete and balanced ecosystem unaltered by human activity. Not a single designated wilderness in the lower 48 can be accurately so described.

Even the Interior Department Draft Assessment of 1002 states that "The Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various Arctic ecosystems in North America." It further states that this area is "the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the Refuge."

In 1977 the U.S. Fish and Wildlife Service successfully opposed the routing of a gas pipe line across the Arctic National Wildlife Range stating that "such a crossing is clearly not compatible with the basic purpose of the Arctic Range". . . The Fish and Wildlife Service continued saying, "we do not believe that the long-term national interest would be served by committing this unique area to development for short-term benefits when its outstanding values for wildlife and wilderness would be forever lost. To protect our public trust and to exemplify our good conscience as concerned ecologists, we must object strongly to any development which would threaten the integrity of the Artic National Wildlife Range". . . "such activity would destroy wilderness values and irretrievably disrupt many wildlife populations and their habitats". . . this Arctic Range is "the last unspoiled area of its kind in the entire Northern Hemisphere."

That says it all. It is, in fact, literally the very last of its kind. Once compromised we will never again see on the planet a comparable Arctic ecosystem representing tens of thousands of years of nature's intricate evolving works unaffected by human activity.

Several years ago Joseph Wood Krutch made a telling observation pertinent to the issue before us. He said, "If people destroy something replaceable made by mankind, they are called vandals; if they destroy something irreplaceable made by God, they are called developers".

There are many landscapes, many wildlife habitats, many undisturbed natural areas far more valuable to mankind than any commodities that may be extracted from them. This Arctic Coastal Plain is such a place. If it is not, then I know of no other. If fully developed, several thousand people will live and work on the Arctic Plain. Huge amounts of gravel will be mined and roads built for heavy equipment; millions of gallons of polluted and toxic water and drilling mud will be stored in fragile ponds and washed away into bird and fish habitats. All of these activities will have serious environmental consequences that cannot be predicted or measured. To argue the proposition that these activities can go on for twenty-five years without major, permanent adverse consequences would be challenged by every ecologist I know of in this country. Indeed, the Interior Department report states: "The existence of oil facilities and activities would eliminate the opportunity for further scientific study of an undisturbed ecosystem."

The question Congress must answer is this:

Do we want to save this rare and remarkable ecosystem in its perfectly natural condition for its intrinsic, esthetic, scientific and philosophic values or do we want to compromise it for its transitory commercial values? We can't have it both ways. We have literally thousands of examples of compromised and degraded ecosystems and almost none that are not. The choice should be clear and simple.

During the past 40 years as an observer and sometime participant in the debates and conflicts over the issue of exploitation of commodities from the public lands versus the preservation of natural habitats the argument has always been the same. Those who insist that all marketplace commodities should be exploited invariably argue that the economy or national security or both require it. They have won most of the arguments in the arena of public lands and almost all of them in the private sector. The result is that very little of natural America is left. We have colonized almost every nook and every niche. Nobody argues that we need not commercially utilize any of our commodity resources. The question is: under what circumstances and guidelines should commodities be developed and under what circumstances should they not. The tragedy is that a great deal of the environmental damage done to the nation in the name of the economy or national security has been unnecessary, economically costly to the nation and degraded the quality of our lives.

Some twenty years ago I was beneficiary of the good fortune to serve on the Senate Interior Committee with one of the most distinguished and influential conservationists of our time, Senator Clinton Anderson of New Mexico, then Chairman of the Interior Committee. He was the most important moving force behind the Wilderness Act of 1964. A year before it passed he wrote an article for the July 1963 issue of American Forests. What he wrote should be read, re-read and pondered by everyone concerned about our future.

> Conservation is to a democratic government by free men as the roots of a tree are to its leaves. We must be willing wisely to nurture and use our resources if we are going to keep visible the inner strengths of democracy.
>
> "For as we have and hold dear our practices of conservation, we say to the other peoples of the world that ours is not an exploitive society -- solely materialistic in outlook. We take a positive position -- conservation means we have faith that our way of life will go on and we are surely building for those we know will follow. . . .
>
> "There is a spiritual value to conservation and wilderness typifies this. Wilderness is a demonstration of our people that we can put aside a portion of this which we have as a tribute to the Maker and say -- this we will leave as we found it.
>
> "Wilderness is an anchor to windward. Knowing it is there, we can also know that we are still a rich nation, tending our resources as we should -- not a people in despair searching every last nook and cranny of our land for a board of lumber, a barrel of oil, a blade of grass, or a tank of water."
>
> -- Senator Clinton P. Anderson
> of New Mexico in American
> Forests, July 1983

I suggest that it is not too late to save something rare and beautiful that cannot be priced in the marketplace.

# # #

Appendix 1

The Wilderness Society
Comments on the final 1002 report
for
Senate Energy and Natural Resources Committee

For over 50 years, The Wilderness Society has been dedicated to the wise management of the federal lands and the preservation of wilderness. The Society's history in Alaska goes back to its very founding by Robert Marshall, an early explorer of the Brooks Range.

The incomparable and indisputable wilderness and wildlife values of the Arctic National Wildlife Refuge, and specifically its coastal plain, have long made it a major focus of The Wilderness Society. The original wildlife range was established in 1960 largely as a result of the tireless efforts of Olaus and Margaret Murie. The late Olaus Murie, President of The Wilderness Society for 17 years, spent years conducting research in the refuge, and Margaret Murie still guides the organization as a member of the Governing Council. The Muries recognized the "unique wildlife, wilderness, and recreational values" the refuge was established to protect. The Interior Department acknowledges that "the wilderness value of the coastal plain of the Arctic Refuge would be eliminated" in the face of development.

WHAT IS AT STAKE

The Arctic National Wildlife Refuge is the only place in the United States where the full range of sub-arctic and arctic ecosystems are found in one continuous spectrum. It is the only place in this country where, with Canada's cooperation, we can protect the entire range of a major migratory caribou herd, one of the last two in the U.S. and our only international herd. The caribou, however, are just one of some 200 species of fish and wildlife that inhabit the Arctic Coastal Plain. The refuge also protects the cultures of indigenous peoples dependent on the rich fish and wildlife of the area for their traditional subsistence way of life.

The Arctic Coastal Plain is the center of wildlife activity for the entire refuge: the biological heart of its many intertwined ecosystems. Therefore the coastal plain cannot be viewed in isolation. The consequences of tampering with this sensitive area will be felt throughout the region.

ENVIRONMENTAL CONSEQUENCES OF DEVELOPMENT

The report to Congress prepared by the Department of the Interior is a purely political document. The conclusions are drawn solely to achieve the administration's goal of opening the Arctic Coastal Plain to development. Nevertheless, much of the information presented in the document is enlightening.

It is important to note that the most evident sanitizing of the report occurred with regard to the effects of development on the caribou and muskoxen herds. In the final report, Interior chose to ignore the findings of its wildlife biologists in order to downplay the anticipated adverse effects to these animals. The Secretary attributes to an editing error the prediction, found in the draft report, that the Porcupine Caribou Herd could decline by up to 40 percent in the face of full-scale oil development. Similarly excised was the conclusion that the muskox population could be reduced by 50 percent.

Though the caribou and the muskoxen receive the bulk of attention, they are but 2 of 200 species that will be affected by industrialization of the Arctic Coastal Plain. For most of those creatures, there is simply not enough known to determine just what the impacts will be. Throughout the report, in regard to virtually every species of wildlife within the refuge, the inadequacies of baseline data and information are cited. It seems wholly inappropriate for the agency, at one moment, to cite its own lack of understanding, and, in the next instant, to state as fact that the effects of development will be minor or moderate. This is exactly the posture taken by the agency with regard to moose, fox, wolverines, wolves, brown bears and polar bears, birds, and many other species of wildlife. Regarding muskoxen, nothing is known about the effects on industrialization on the species. Muskoxen have already been eradicated once from the Arctic Refuge. There would be no excuse for repeating the error.

THE INADEQUACIES OF THE BIOLOGICAL DATA AND ANALYSIS

The report fails to analyze thoroughly the coastal plain's natural environment and the problems and impacts posed by exploration and development. Though the report accurately states that the "Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America," it fails to elucidate the biological significance of this fact. The long-term effects of oil and gas development cannot be understood without an explanation of the complex ecological processes and interrelationships of these ecosystems. It is also important to note the value of such an undisturbed region for scientific purposes. In light of the development now occurring or anticipated in the arctic, it is particularly important to have a control against which the effects of those activities can be measured. The report states: "The existence of oil facilities and activities would eliminate the opportunity for further scientific study of an undisturbed ecosystem."

The report acknowledges the lack of fresh water supplies in the area and the need for large quantities of water for both exploration and development. Yet it does not adequately explain how water will be obtained and what the environmental consequences of extraction will be, particularly to fish. Experience at Prudhoe Bay shows that reduction in the quantity and/or quality of water available to overwintering fish is likely to have serious impacts on fish stocks. Therefore water should not be withdrawn from spring areas.

Another resource essential to petroleum exploration and development is gravel which, like water, is extremely scarce in the 1002 area. The report does not adequately address the sources of gravel, the potential for rehabilitation of materials sites, and the impacts on fish and wildlife. To date, no Prudhoe Bay sites have been returned to a standard suitable for fish and wildlife use.

DIFFERENCES BETWEEN PRUDHOE BAY AND THE ARCTIC COASTAL PLAIN

The Arctic Coastal Plain is dramatically different from the Prudhoe Bay area and so analogies between the two must be drawn with extreme caution. The habitat of the Arctic Refuge is far richer than the area to the west. As a consequence, the wildlife is denser and more varied which is, in part, what led to the area being designated a wildlife range in 1960.

The width of the coastal plain of the central arctic averages about 75 miles, that of the refuge averages about 25 miles. The difference in the widths is significant in regard to the caribou. The Porcupine Caribou Herd is more than twelve times larger than the Central Arctic Herd, yet the former has about one-fifth the available calving habitat. Thus as development has displaced the Central Arctic Herd from its historic calving grounds, it has had considerable alternative, equally desirable, land to use. The preferred calving grounds of the Porcupine Herd, however, are hemmed in by the Brooks Range to the south and the Beaufort Sea to the north, leaving only the less desirable calving habitat in Canada as an alternative. The effect would be detrimental to the herd. Preliminary research indicates higher calf mortality when the herd is forced to calve in Canada because of weather conditions.

There are other differences between the two herds. The Central Arctic Herd is a resident herd while the Porcupine Herd is migratory. Thus the latter, being in the presence of any development for only a short period of time per year would not be able to habituate to it to the degree the Central Arctic Herd has to Prudhoe Bay. The oil industry often touts the fact the the Central Arctic Herd has tripled in size since the development began, but they fail to tell the whole story. The herd's main predators, the grizzly bear and the wolf, have been hunted or driven out of the Prudhoe Bay area. In addition, all Alaska's caribou herds are currently on the rise in their highly cyclic population curves.

POLLUTION IMPACTS

Industry claims Prudhoe Bay is a faultless model of clean development, but such claims belie the facts and one's intuition. One must remember that Prudhoe Bay is one of the most highly industrialized places in the world. It covers about 80 miles of arctic coast and extends several miles offshore. It includes hundreds of miles of roads, made of gravel up to 20 feet in depth. Hundreds of miles of pipelines bring oil from hundreds of drill pads to Pump Station 1, the beginning of the Trans-Alaska Pipeline. This intricate complex is built in one of the most sensitive environments subject to some of the harshest conditions in the world. As a consequence, any disruption of the environment will not recover for a long time. Whether or not Prudhoe Bay has been operated in the most environmentally sound manner possible, no one denies that it is no longer a wilderness.

One reason assertions of perfect operation have gone largely uncontroverted is that Prudhoe Bay has not been subjected to the kind of monitoring appropriate to a major industrial facility. For example, it has been ten years since the first barrel of oil went into the pipeline, yet the first air quality monitors were installed only last year. As a result it is not known whether Prudhoe Bay is in compliance. What is known is that the facility is permitted to emit about half the amount of nitrogen oxides (NOx) emissions as New York City. NOx is a major component of smog and a cause of ozone pollution. Furthermore black smoke incidents caused by startup and "emergency" gas flaring are a serious problem. Last year, when the Lisburne field was started up, black smoke was visible for 30 to 50 miles for up to 40 days.

On the grounds that an air quality model for the Arctic Refuge would be speculative, Interior failed to make any air quality predictions for the refuge in the report to Congress. The report also fails to address the contribution that air pollution from the Prudhoe oilfields is having on a relatively little understood problem known as Arctic haze. What is known is that the once-pristine arctic air is becoming increasingly fouled by development in this and other countries. This may have serious implications for global air quality and contribute to climatic warming, commonly known as the "greenhouse effect."

There is no mention in the report of the dangers of hazardous waste spills such as ARCO's contractor, North Slope Salvage Company's 1983 spill involving more than 10,000 barrels or how this waste might be properly disposed of should oil development be authorized by Congress.

The Resource Conservation and Recovery Act (RCRA) exempted the oil industry from some of its provisions. Consequently, drilling muds contain certain substances, e.g. toluene and benzene, generally considered hazardous, but are not handled as such. Most drilling muds are reinjected into the wells, but no one knows what long-term effects will ensue or whether these substances are finding their way into the aquifers. The Alaska Department of Fish and Game (ADFG) is concerned about industry's practice of controlling road dust by applying reserve pit supernatant, further spreading these harmful pollutants to uplands or other wetland areas. In addition, until 1983, no permits were required for the annual spraying of 800,000 to 2.5 million gallons of it directly onto the tundra and onto roads. Now only the state regulates these discharges, but their real impacts are still unknown. Would this sort of practice be allowed in the refuge?

The RCRA exemption has also caused some confusion as to exactly what wastes qualify. Therefore reporting has been faulty and incomplete. For example, wastes reported as sent are sometimes not reported as received and vice versa. Furthermore, the overall volumes of hazardous waste are unknown, since there is great variation in which types of wastes industry chooses to report.

Improper disposal of drilling waste is seriously affecting water quality in the vicinity of the Prudhoe oilfields. The 900-square-mile complex contains 500-600 wells, with operations producing approximately 840,000 gallons of drilling muds per well per year. Alaska Department of Environmental Conservation (DEC) reports indicate that discharges from 20 out of 21 major drilling mud reserve pits violate EPA standards, discharging toxic chemicals and heavy metals such as arsenic, barium, lead, manganese, chromium, zinc, and copper, brine, and carcinogens such as aromatic hydrocarbons into aquatic and wetland habitats. The ADFG is concerned that this practice would continue in the 1002 area and will "result in chronic and/or acute contamination of wetland organisms by heavy metals, hydrocarbons, or salts."

In addition to the leaks, regular incidents of breaching occur which release hundreds of thousands of gallons of wastewater. The ADFG concludes that "although the data are strongly suggestive that impacts to fish and wildlife habitat and to lower food-chain organisms are occurring as a result of reserve pit discharges to the surrounding environment, the conclusive link, that of effects on higher food-chain organisms, remains to be proven. However, all indicators suggest that such impacts can and probably do occur -- water quality degradation around the pits has been documented, uptake of compounds known to be detrimental to organisms in laboratory conditions has been found, an important aquatic food-chain organism has been affected, and aquatic invertebrate community structure has been changed."

It is therefore perfectly reasonable to conclude that oil development in the coastal plain of the refuge would compound the existing pollution problems on the North Slope and affect a greater number and variety of wildlife species. Moreover, the health of humans living in and adjacent to the refuge, as well as others in North America who consume migratory species, could be affected through consumption of contaminated animals. What is certain is that studies have either not been undertaken or are inadequate to make these determinations. Meanwhile the industry continues to pollute unabatedly and hopes to expand the current operation into a national wildlife refuge.

The assessment is seriously deficient in addressing the effects of pollution from oil development on the refuge and its sensitive wetlands, aquatic systems, and wildlife. For instance, the report fails to mention that there have been nearly 1,000 reported oil spills at Prudhoe in the past two years, totalling 193,000 gallons. Spills of up to 600,000 gallons have been reported in previous years. Studies have shown that 30-year old spill sites in Alaska show little signs of recovery.

WILL OIL FROM THE ARCTIC REFUGE AFFECT OUR ENERGY SECURITY?

The Wilderness Society believes that opening the coastal plain of the Arctic Refuge to oil and gas leasing is not a sensible way to achieve the nation's long-term energy goals. Producing oil from the wildlife refuge would not significantly reduce our oil imports or foster energy security. Petroleum exploration and development would, however, degrade or obliterate the wilderness values of this national wildlife refuge.

The Interior Department and others who support opening the Refuge to leasing and development point to the fact that the U.S. is now becoming more dependent on foreign sources of oil and therefore more vulnerable to future foreign oil supply interruptions. Stated in these terms, the decision on whether or not to open the Arctic Refuge to development prompts the following question: Will potential production there make a significant contribution to our future energy security?

We can estimate the refuge's potential contribution to national energy security by using numbers from the Interior Department's report. Recognizing that the risk of not finding oil is 81 percent, it is estimated that, over the lifetime of oil production, expected output from the Arctic Refuge will total less than one percent of U.S. imports of oil.

Regardless of the amount of oil found in the wildlife refuge, the first barrel could not be produced until 1998 at the earliest, and more likely the year 2000 or later. These numbers clearly indicate that the Arctic Refuge may never make a significant contribution to national energy security.

THE INTERIOR DEPARTMENT'S ECONOMIC ANALYSIS IS FLAWED

Even though the refuge will not solve our energy security problems, the Interior Department asserts that other large economic benefits may be gained from oil production in the region. The Department's report claims that there is a 19 percent chance of finding economic quantities of oil. Furthermore, the expected economic benefits of oil production, measured in terms of cashflows to the state and federal governments and after-tax profits of oil producers, amount to approximately $16 billion in today's dollars.

Unfortunately the Interior Department report is seriously flawed in at least three ways:

> (1) The Interior Department report is overly optimistic in its geologic assessment of the coastal plain region. In the opinion of the State of Alaska, the Government of Canada, and others, the report has overstated (a) the likelihood of finding oil in the region and (b) the amount of oil that might be found. The State of Alaska has stated in an independent geological report that the region has approximately one-half of the amount of in-place petroleum projected in Interior's report.
>
> (2) Consistently ignored by the Interior Department is the fact that, according to their own calculations, there is only a 19 percent chance of finding producible oil in the 1002 area. Neglecting this fact allows Interior to overstate the economic benefits of oil production by a factor of 5. Even by Interior's estimates, the probability that the Arctic Refuge is

"another Prudhoe Bay" is only one chance in 100.

(3) According to review comments by the Interior Department's own Minerals Management Service: "In view of the fall of oil prices in 1986 and the unpromising view for increases in the near future, the resource and economic benefit methodology and assumptions should be reviewed and perhaps redone to reflect more realistic numbers." The final report of the Interior Department presents the results of studies that were initiated before the oil price drop that occurred last year and prior to the enactment of the recent tax reform legislation. Because of these outdated assumptions, the economic benefits and the probability of finding producible quantities of oil in the 1002 area are overstated in the Interior Department report.

The Wilderness Society has examined the economics of oil production in the Arctic National Wildlife Refuge using the Interior Department's resource assumptions, updated oil price scenarios, and employing a financial analysis that incorporates the provisions of the new tax law. The results of this study, to be published in the July issue of Materials and Society, show that the expected economic benefits of oil production in the refuge range from $0.3 to $1.4 billion in today's dollars. These estimates are significantly lower than the $16 billion estimate of economic benefits derived from the Interior Department report. Also, the probability of finding producible oil drops from Interior's estimate of one chance in five (19 percent) to the Wilderness Society's revised estimate of one chance in eight (12.5 percent).

Given these differing estimates, how can we evaluate the oil and gas potential of the 1002 area? Both the Interior Department and The Wilderness Society studies support the following conclusions: (1) if the Arctic Refuge is opened to leasing and development, there is only one chance in 100, or less, that as much oil will be found as in Prudhoe Bay, and (2) there is between an 81 and an 88 percent chance that no oil will be produced.

NATIONAL PETROLEUM RESERVE -- ALASKA

Instead of comparing the wildlife refuge to Prudhoe Bay (one chance in 100), we should compare it to the National Petroleum Reserve-Alaska (NPR-A).

In 1979 the Department of Interior issued a petroleum assessment report for NPR-A, located just west of Prudhoe Bay. According to the 1979 report, there was a 97 percent chance that NPR-A contains producible quantities of oil. In fact, the number of barrels of oil that were expected from NPR-A is three times greater than the amount now expected from the refuge. The economic benefits from oil production in NPR-A were expected to be eight times larger than the economic benefits currently projected from the 1002 area.

Since 1979 at least 39 holes have been drilled in NPR-A and no producible oil has been found. In fact, the results of exploration in NPR-A are so disappointing that no oil companies bid on the latest lease sales for the most promising areas remaining to be drilled in NPR-A. There is at least an 81 percent chance that this is the scenario that will be encountered in the Arctic Refuge.

In Alaska, we should concentrate future exploration efforts in high petroleum potential areas outside of sensitive areas such as the wildlife refuge. The coastal plain of this refuge represents less than 3 percent of the favorable oil and gas areas on the North Slope.

There are many options to reduce our current and future energy dependence. The refuge's tiny potential contribution to meeting our future petroleum needs emphasizes the fact that the most effective approach to increasing energy security is to make a stronger commitment to energy conservation. Reducing our future consumption of oil means that we will be less vulnerable to foreign supply interruptions. Current interest in the field of superconductivity could generate tremendous fuel savings. Also, mandating more stringent automobile mileage and appliance efficiency standards, and legislating effective incentives for energy conservation will decrease the shortfall between projected future domestic production and consumption.

Another long-term strategy for energy security is to support increased research and development activities in the enhanced recovery of petroleum. According to the Department of Energy, about 300 billion barrels of oil are currently identified in the U.S. that cannot be produced with today's technologies. This figure represents over ten times our current level of oil reserves. Even a small improvement in our recovery techniques, when applied to this massive resource, could yield many billions of barrels of oil in fields that are already known.

Development of alternatives for liquid fuels should also be encouraged. Much of the current concern about our energy future is due to the fact that we do not have a good substitute for oil and oil products. We do have large reserves of natural gas and huge reserves of coal. Support for development of technologies that use fuels other than petroleum, such as methanol, will lessen our oil import vulnerability.

The switch to a non-oil based economy appears inevitable. Whether we make the liquid fuels transition smoothly or painfully depends on how we change our energy consumption habits and our ability to utilize alternative fuels. The development of ANWR, regardless of the amount of oil that is found there, will have no impact on this transition.

On the other hand, the environmental consequences of a decision to lease and develop this unique natural area are irreversible.

CONCLUSION

Among the many unknowns, one certainty remains: development of the Arctic Coastal Plain would devastate the sensitive and unique wilderness environment and would prove highly detrimental to the wildlife that thrives in the area. In light of the known high degree of harm threatened by development and the low probability of petroleum, there is no reasonable justification for the Interior Department's full-scale leasing recommendation.

The coastal plain of the Arctic National Wildlife Refuge is irreplaceable and far too precious to be squandered for what may, at best, be a few months worth of petroleum. The Wilderness Society urges Congress to grant this area the protection it so richly deserves as a unit of the National Wilderness Preservation System.

The **Chairman**. Thank you very much, Senator Nelson. Senator Stevens was just saying, you never looked so good when you were up here.

Senator **Nelson**. I am not working very hard.

The **Chairman**. All these serene thoughts about wilderness must be very healthy.

Senator **Nelson**. It is a good place to go. Come along and I will take you.

The **Chairman**. Next we are happy to hear from Jay Hair, president of the National Wildlife Federation.

STATEMENT OF DR. JAY D. HAIR, PRESIDENT, NATIONAL WILDLIFE FEDERATION

Dr. **Hair**. Thank you very much, Mr. Chairman. I am honored and pleased to be here today as president of the National Wildlife Federation, and to represent the views of our 4.6 million members nationwide.

I do have a formal statement that I would like to submit for the record.

The **Chairman**. Without objection.

Dr. **Hair**. I think that I can perhaps be most helpful to you and the Members of the Committee by abbreviating my comments and responding to questions later on. But before doing that I do have a few important points that I would like to make.

First, my personal experience with Arctic ecosystems and the Porcupine Caribou Herd first began in the late 1960s, when I was a graduate student at the University of Alberta. I do understand a bit about Arctic ecosystems and the kinds of processes that make them function and make them valuable.

Also I would like to call to the Committee's attention the report that the National Wildlife Federation submitted to Congress back in early March, entitled The Arctic National Wildlife Refuge Coastal Plain: A Perspective For The Future.

In this report, which we feel is perhaps a report in many dimensions far superior to that which you received from the Department of Interior, we identify what we think are four crucial areas that Congress must have significantly more rigorous and significantly better information around which to make a decision.

Those areas deal with the broad topic of national energy policy as it might relate to national security, the wide range of fish and wildlife resources that have not yet been adequately identified and addressed, the environmental impacts, particularly the environmental impacts of ongoing operations and cumulative environmental impacts of circumpolar development, and the secret land trades that have been underway by the Department of the Interior for the last several months.

We also identify that that portion of the 1002 area, the southeastern quadrant, is so valuable to the fish and wildlife resources, particularly the Porcupine Caribou Herd, that is ought to be legislatively designated now as wilderness and protected without compromise into the future.

I would emphasize that that does not diminish our interest in seeing the entire Coastal Plain considered for wilderness development by the 1002 commission that we are advocating.

The points that I guess I would like to make, because you have read and you have heard a great deal about the issues there, and in my view it is not an issue of oil versus caribou. It is not national security.

What the issue really is is an issue of values. It is the values that we as a society place on wild places. The values that we as a society have for the stewardship, responsibilities to future generations, not just those of us who are enjoying the earth's resources today.

It is the values about a national energy policy. Here we find ourselves in 1987 driving into the tunnel of the future, and our headlights are off. It is the values associated with responsible public policy decision-making.

And therein I think lies our greatest concern, that this Committee and other Members of Congress would try to come to grips with. What is the responsible database?

What is the responsible information that you as the Members of Congress, the people that we trust as a society to make wise decisions about a range of societal values, what do you need to know that you do not now know in order to produce a responsible public policy?

What I would like to do in the few minutes remaining is to talk about the ongoing operations in the North Slope of Alaska.

Unfortunately, since we cannot be there today, I would like to take advantage of some of the color photographs that I have in the back of my report to illustrate to you some of the concerns that we think are very unaddressed to date, and which this Committee must have the information before a responsible decision can be made.

The first picture that I have, and this is the one I am referring to, that gives a general view of the current field operations. I suppose it is well to summarize that there are approximately 1,000 wells currently in production on the North Slope of Alaska in the four fields of Prudhoe Bay, Kuparuk, Lisburne and Milne Point.

They are producing about 1.9 million barrels per day. It is about one-fifth of the nation's demand. I think that anyone who has been there, as I have on several occasions, would commend the industry in working under very difficult conditions.

But if they are concerned about where this nation is going, would also call into question whether or not we as a nation have committed adequate resources to understanding the environmental impacts of ongoing development today.

We are producing over 100,000 tons of NOx emissions. You can see some of the flaring activity there in the background. This is approximately one-half of what the five boroughs in the City of New York produce annually. About 196,000 tons of NOx emissions.

By the EPA model, this monitoring that has been done to date, based on one year, underpredicts by a factor of 2 to 5 the NOx emissions and their environmental impacts. I would also point out that one of the important processes associated with oil development, of course, is the discharge of materials into reserve pits.

We are now allowing and permitting the discharge of water from those reserve pits onto the roads for dust control. Some 64 million gallons were discharged in 1986. Onto the tundra, some 36 million gallons.

We know that those fluids contain heavy metals, arsenic, chromium, manganese, copper. We now they bio-accumulate. It has been said, and I do not think it overstates, that perhaps what we are creating on the North Slope of Alaska is the nation's largest Superfund site.

One only has to remember what happened at Times Beach when we disposed of PCBs and oil waste at that place. The point being, is we need to understand more about the impacts, the discharge of materials onto the tundra, onto the road, and their bio-accumulation in that important ecosystem.

We know that of the 43 pits, 35 of them last year exceeded the permit effluent limitations. The State of Alaska has also told us that in 1985 there were 521 oil spills on the North Slope of Alaska, resulting in some 82,000 gallons discharged onto a very fragile ecosystem.

The next picture that I have is one that shows basically uncontrolled and essentially unmonitored burning. We do know the phenomenon called Arctic haze. I think we do understand that most of the airborne pollutants from that phenomenon occur in Russia and northern Europe.

We are also contributing significantly to that. The fact that the state, EPA, and others have not had adequate monitoring or on-site activities associated with that causes those of us concerned about responsible resource development, responsible resource management, great concern as we move forward on this issue.

The picture at the top, I think, is pretty well self-explanatory. Because of the lack of monitoring, because of the lack of emphasis placed on disposal of materials, what you have here is a picture of the North Slope Borough oxbow landfill. Oily waste pit near dead horse.

Not a very pretty sight. Not a very responsible way to encourage development, I think, in anybody's imagination.

The CHAIRMAN. That is a landfill? With the cars there?

Dr. HAIR. Yes, sir. The next picture——

Senator FORD. It looks like our local used car lot.

Dr. HAIR. The next picture is a picture of some drum flaring, to rid those drums of some unknown residues, exhausted into the Arctic atmosphere. Again, unmonitored, uncontrolled, and irresponsible activities as far as we are concerned.

It has been mentioned and it is obviously clear that one of the activities associated with North Slope development if the need for significant amounts of gravel. Gravel for building both roads, gravel for building pads for the drilling rigs, and gravel for building the causeways out into the Beaufort Sea.

What you have here is a picture of the Arco gravel mine site, and I would point out that you have several examples there of where, because of lack of permitting and lack of monitoring, you have overburden eroding into the Arctic streams.

Those conclude the pictures. And I only bring them because I think it is important to try to illustrate a couple of points. The first point is that we really do not know what has been the environmental impact of 10 years of development on the North Slope.

And we really must know before we allow what is probably the world's greatest Arctic ecosystem to even be considered for exploration or future development. In our view, it is time for reason to prevail over rhetoric. In our view it is time for good science to prevail over political ideology.

We believe that Congress has an extremely important public policy decision before it, and we believe that you have not been presented yet with a complete set of information on which to make such a profound decision for the public. Thank you, sir.

[The prepared statement of Dr. Hair follows:]

Working for the Nature of Tomorrow™
NATIONAL WILDLIFE FEDERATION
1412 Sixteenth Street, N.W., Washington, D.C. 20036-2266 (202) 797-6800

Statement of

Dr. Jay D. Hair
President

National Wildlife Federation

Before the

Senate Energy Committee

Washington, D.C.

on
June 11, 1987

Mr. Chairman and members of the Committee, I appreciate the opportunity to testify before you. My name is Jay Hair and I am President of the National Wildlife Federation (NWF). Our organization is the nation's largest not-for-profit conservation organization, with over 4.6 million members and supporters in 51 state and territory organizations.

The NWF has a historical association with Alaskan conservation issues and this testimony is presented with the support of our affiliate, the Wildlife Federation of Alaska.

My testimony will focus on two aspects of the debate over the Arctic National Wildlife Refuge: the Department of the Interior's 1002 Report and Secretary Hodel's recommendation to the Congress and environmental pollution problems currently being experienced on the North Slope which could have serious impacts on the Arctic National Wildlife Refuge, if similar development is undertaken there.

1002 REPORT

The report is a reflection of a largely political decision made on the basis of the information at hand. Although the report is inadequate to support the sweeping nature of the recommendations advanced, it is evident the fundamental work that went into the study itself was done competently by highly professional employees of several parts of the Interior Department. Career employees from the U.S. Fish and Wildlife Service, the U.S. Geological Survey, and the Bureau of Land Management devoted hundreds of thousands of hours to this complex issue and these dedicated resource professionals are to be commended. They did their work under the pressures of time, with limited resources, under difficult political circumstances, and much of the field work was done under conditions among the harshest and most challenging anywhere in the world.

The Secretary of the Interior, in furtherance of the 1002 study report recommends leasing, exploration, and possible extraction in one of the most sensitive and fragile areas on the continent. The coastal plain is recognized as one of the most important wildlife areas anywhere on earth. The coastal plain is part of 8.9 million acres set aside in 1960 as a National Wildlife Refuge. It was enlarged to 19 million acres in 1980 by the Alaska National Interest Lands Conservation Act (ANILCA). The Arctic National Wildlife Refuge is a unit of the only national public land management system established exclusively for the protection of fish and wildlife and its habitat. The report does not provide information adequate to make reasoned decisions, does not adhere to the requirements of the National Environmental Policy Act, and fails to recognize the implications of the U.S. Fish and Wildlife Service mitigation policy.

The Secretary's proposal is flawed further because it recommends actions that are not compatible with the purposes of the refuge, that will result in damages that cannot be mitigated, and is made without justifying the argument of national security needs. The recommendation demands a great leap of faith in suggesting that it will be possible to engage in oil and gas development activity in this extraordinary area without serious damage to the fish and wildlife or the habitat upon which they depend. Yet it does so without any real evidence that this work can go on without jeopardizing natural resources of international importance and upon which many Native American citizens depend for their very survival. In fact, the report contains powerful evidence that it cannot be done without serious harm to the Arctic National Wildlife Refuge.

Apart from the unwarranted conclusions and recommendations reached in the report, which reduce its credibility to an unacceptable level, the process by which these decisions were made reveals the absence of any concern for public participation in deliberations having a profound impact on one of the treasures set aside for all citizens of this nation.

From the outset, the political appointees of the Department of the Interior seemed determined to make their recommendations without involving the public. Statutes that require public participation in these processes were ignored: among them, the Administrative Procedures Act and the National Environmental Policy Act. Only after a lawsuit (Trustees for Alaska v. Hodel, 802 F.2d 1328 [9th Cir. 1986]) had been filed by several environmental organizations did Interior Department officials agree to hold public hearings on the issue.

Officials of the Department did not consult with the government of Canada, though among the primary wildlife resources of the coastal plain is the Porcupine caribou herd (PCH), numbering about 180,000 animals, which calves on the Plain and migrates annually in a circular route taking it into western Canada. At the time the report was being prepared, and only a matter of days before the Draft Assessment version was produced, representatives of the United States and Canada met in

Seattle to initial a "protocol" agreement that is intended to provide the mechanism for the long-term management of this international resource. After a complaint from the Canadian government, Interior officials extended the "comment period" for the Draft Assessment to February 6, 1987, and hastened to Ottawa on February 3, 1987, to make a formal representation to Canadian government officials. The concern of the Canadians for this shared resource has been obvious for many years, yet Interior Department officials seemed bent on ignoring the interests of one of our country's most committed allies and a long-time cooperator in the management of other shared resources, including fish, migratory birds, and marine mammals. Furthermore, in recent days the Interior Department has asked for wording changes in the protocol -- a document previously approved by the negotiating teams from both nations -- that will serve only to weaken the agreement.

It is evident also, from documents prepared by the State of Alaska, that Interior largely disregarded information and insights offered by various State agencies which have accumulated data and observations from decades of work with the resources of the area -- oil and gas as well as fish and wildlife and other environmental resources.

The history of the development of the recommendations indicates a rush to make a judgment that is basically political in nature, and a disturbing disinclination to consult with others in the process. For example, there is no evidence Interior consulted with experts in the U.S. Environmental Protection Agency to get information about the problems of air pollution originating from oil extraction activities, or about problems of potential pollution of surface and ground water from the disposition of toxic wastes that are by-products of oil extraction. Such consultations might well have altered the nature of the recommendations contained in the final report.

During the course of the study process, but independent of it, senior appointees of the Interior Department entered into discussions with Native Corporations to explore the possibility of exchanging title to the publicly-owned petroleum resources of the coastal plain for native-owned inholdings in and near other wildlife refuges in Alaska. While it is conceivable exchanges of this kind might have had merit, the Department elected to conduct the discussions and land assessments in secrecy, avoiding any possibility of public involvement in these critical affairs. These negotiations were undertaken with a cynical disregard for possible public reaction -- and the fact that the lands involved are public lands, not to mention a part of a widely-treasured National Wildlife Refuge System.

A combination of elements, including a report and Secretarial recommendation that one of the most critical environmental decisions of the decade should be made on the basis of incomplete and inadequate information, a cavalier disregard for the interests of Canada, a venture into a secret process intended to result in an exchange of subsurface resources of potentially incalculable value for surface interests that subsequent investigations reveal generally do not require the added protection of government ownership, and overt actions that imply a bias in favor of petroleum exploitation, lead an even marginally objective observer to conclude that the report and the Secretary's recommendations are unsound and so flawed as to be utterly without foundation.

For example, the Draft Assessment issued last year says that taking 15 million gallons of water for a single exploratory well could have a "major adverse effect." That statement also notes that "the large quantities of water required for development drilling on the 1002 area are not available."

But, apparently, the decision to recommend full leasing had been made already. The final report on which the Secretary's recommendation is based, says that, with full oil field development, "there should be no need to disturb critical fish habitat." There is only one source of fresh water on the Arctic coastal plain -- Sadlerochit Spring -- that is large enough to overwinter fish.

We are left with an uncertainty: Will the use of 15 million gallons of water for one exploratory well have a major adverse effect or won't it?

We think such massive water usage will have a major adverse effect. And we believe the professionals who wrote that part of the draft report meant what they said originally.

Let me give another example. The draft EIS states that "78 percent of the Porcupine caribou's herd's core calving area is within the 1002 area." And the calving area is a "unique and irreplaceable" habitat. The draft EIS actually said that full oil field development would create a "complete loss of habitat values" for about one-third of the most critical core calving areas.

Yet all references to the core calving area disappeared from the final document; the one on which the Secretary bases his recommendation. That disappearance has to rank as the fastest truncation of biological evolution ever recorded!

It is of interest to note that the petroleum industry also has argued that no core calving area exists.

The potential existence of hydrocarbon on or adjacent to the 1002 area is, of course, the economic question driving this process. Because of the importance of the economic issues, the National Wildlife Federation retained its own petroleum geologist to give an independent assessment of the seismic information available at the time the draft report was issued. He reported that the potential -- at least as can be projected from geologic formations -- does appear significant. However, once again, the Department of the Interior has been misleading.

The Secretary's report to Congress would lead the public to believe there is a 19 percent chance of finding more than 3 billion barrels of oil in the refuge. That's not so.

The report actually indicates only a 7 percent chance of finding more than 3 billion barrels of oil. There's a 93 percent chance of _not_ finding that much oil. And there is only a _one percent_ chance of finding more than 9 billion barrels of oil. Given these inaccuracies, obfuscations, and flaws, Congress should not rely on Interior's report as a basis upon which to make wise decisions.

ENVIRONMENTAL PROBLEMS

A great deal has been said already about the Arctic's fish and wildlife treasures. Today, I want to focus more attention on broad environmental issues -- such as air and water quality and the hazards posed by toxic substances.

These environmental issues have received far less attention than -- say -- the Porcupine caribou herd. But they are a root cause of concern and a key reason why we need more rigorous research and environmental monitoring.

AIR POLLUTION

The oil industry has said publicly -- and in correspondence to the Federation -- that operations at Prudhoe Bay are "excellent examples of environmental compatibility." They have consistently maintained that industry's performance meets or exceeds all air and water quality standards.

When it comes to air quality, there is one major flaw in industry's reasoning: When the oil industry claims their Prudhoe Bay operations meet or exceed air quality standards, they are measuring their performance against the least stringent national standard. They are using the National Ambient Air Quality Standards as their yardstick. That is misleading and unacceptable.

The National Ambient Air Quality Standards are America's baseline standards. They are used in large cities where the air is already so polluted that it is a threat to human health. It is a completely inappropriate standard for the pristine wilderness of the Arctic Refuge.

In fact, oil companies in Alaska are required by law to operate at a level above that minimum -- at a level called the

Class Two increment. That designation is to ensure that current air quality will not be lowered significantly.

The monitoring data we have to date -- and the data are still sketchy -- do show violations of air quality standards. For instance, measurements taken in 1979, 1980 and 1986 show violations of the national standards for total suspended particulate matter.

The first quarterly measurement of total suspended particulate matter, for example, shows Prudhoe Bay emissions are more than double the Class Two standards for annual mean concentration. That figure is from just the first quarter of monitoring. It is still impossible to judge whether emissions of total particulate matter for a full year will violate federal standards.

The Federation mentioned some of these violations in our report on the Arctic National Wildlife Refuge. The mention elicited a predictable protest from some oil industry representatives.

But more important than currently available data is the lack of data. Information about air quality at the North Slope is, quite simply, incomplete.

First, there has been vast development on the North Slope since monitoring was conducted in 1979 to 1980. Right now, two oil companies are cooperating with EPA to collect more data from monitoring, and we hope that information will be more accurate than that provided in the past. But until sufficient information about air quality is in hand, a responsible decision cannot be made about oil development in that sensitive ecosystem.

That holds true for the problem of nitrogen oxides, which are the primary air emissions from the North Slope. EPA won't have any Class Two increment standards for nitrogen oxides until at least 1988. Until then, it will be nearly impossible to judge the industry's performance.

New information about air quality on the North Slope is being collected. EPA, for instance, is cooperating with Washington State University to evaluate how air pollutants are dispersed in the unique Arctic ecosystem.

But only with more intensive and systematic evaluation of the air around the North Slope can we say with any certainty whether air quality is deteriorating because of industry's presence. Likewise, we have no information about the cumulative environmental impacts as a result of circumpolar development. The so-called "Arctic haze" phenomenon must be better understood.

Until then, we have little basis upon which to decide to develop oil fields in the Arctic National Wildlife Refuge.

HAZARDOUS WASTES

Extraction of oil is a complicated process whose byproducts can add not only to the nation's energy supplies, but to our hazardous waste burden as well. When a well is drilled, a special slurry is used to lubricate the drill bit and carry away material cut out by the drill.

This slurry is generally referred to as "drilling mud," although it is really a mixture of bentonite and various hazardous chemicals.

Just what is the effect of dumping such drilling wastes in pits? According to one report, discharges from 20 of 21 pits at Prudhoe Bay violated state standards. Violations included high concentrations of such toxic metals as arsenic, manganese, chromium, lead and copper.

In fact, the U.S. Fish and Wildlife Service found that natural ponds about 100 meters from the pits lost more than half the invertebrates typically found in undisturbed ponds. In ponds directly adjacent to the pits, 12 of 13 invertebrates were usually missing, thus decimating the food chain that wildlife relies on.

The same study showed that chromium levels in ponds near the drilling sites frequently exceeded federal toxicity standards designed to protect aquatic life.

Even today, industry routinely violates the standards for discharge of drilling fluids. According to industry data submitted to the Alaska Department of Environmental Conservation, 35 of 43 discharges in 1985 violated state standards.

Moreover, we believe state standards are insufficient. They are designed to protect human health, but not aquatic life, which is generally more sensitive to low levels of toxic contaminants in water.

Consider chromium, for example. By state standards, chromium levels are allowed to be five times higher than EPA has determined is necessary to protect aquatic life. The state, unfortunately, has no standards governing the levels of copper, zinc, aluminum, boron or manganese.

Another serious problem has been the spraying of contaminated fluids on gravel roads for control of dust. The gravel is permeable. Therefore, it provides a conduit for contaminants to reach the delicate tundra.

Lamentably, there is already a history of illegal dumping of hazardous wastes in Alaska. The Federation found that, on the North Slope, dozens of compounds had been disposed of improperly, including benzene and 22 different substituted benzenes; biphenyl; 13 different carboxylic acids and esters; 21 classes of unsaturated hydrocarbons; and four unknown propanols.

From July 1982 to April 1983, oil companies and others delivered their wastes to an illegal dump. That dump was cleaned up only after the Alaska Department of Environmental Conservation doggedly pursued the issue. By the time cleanup ended in mid-1983, 58,000 gallons of liquid wastes, 1600 cubic yards of contaminated solid wastes, and 14,000 drums had been removed.

The dump operators eventually were convicted on several counts of criminal misconduct.

Finally, there is the issue of bioaccumulation of toxins. The Interior Department's report made no mention of the issue. Indeed, it barely has been studied.

But there is already evidence that Arctic conditions are tailor-made for bioaccumulation. During the spring melt, water flows freely over the tundra, distributing contaminants which are pumped or leached from the highly permeable waste pits.

Contamination from Prudhoe Bay reserve pits have shown a twofold increase in aluminum and barium concentrations in exposed fish. And toxic compounds known to bioaccumulate are found at drilling sites. It is only a matter of time before even more toxins are detected in the area's fish.

CONCLUSION

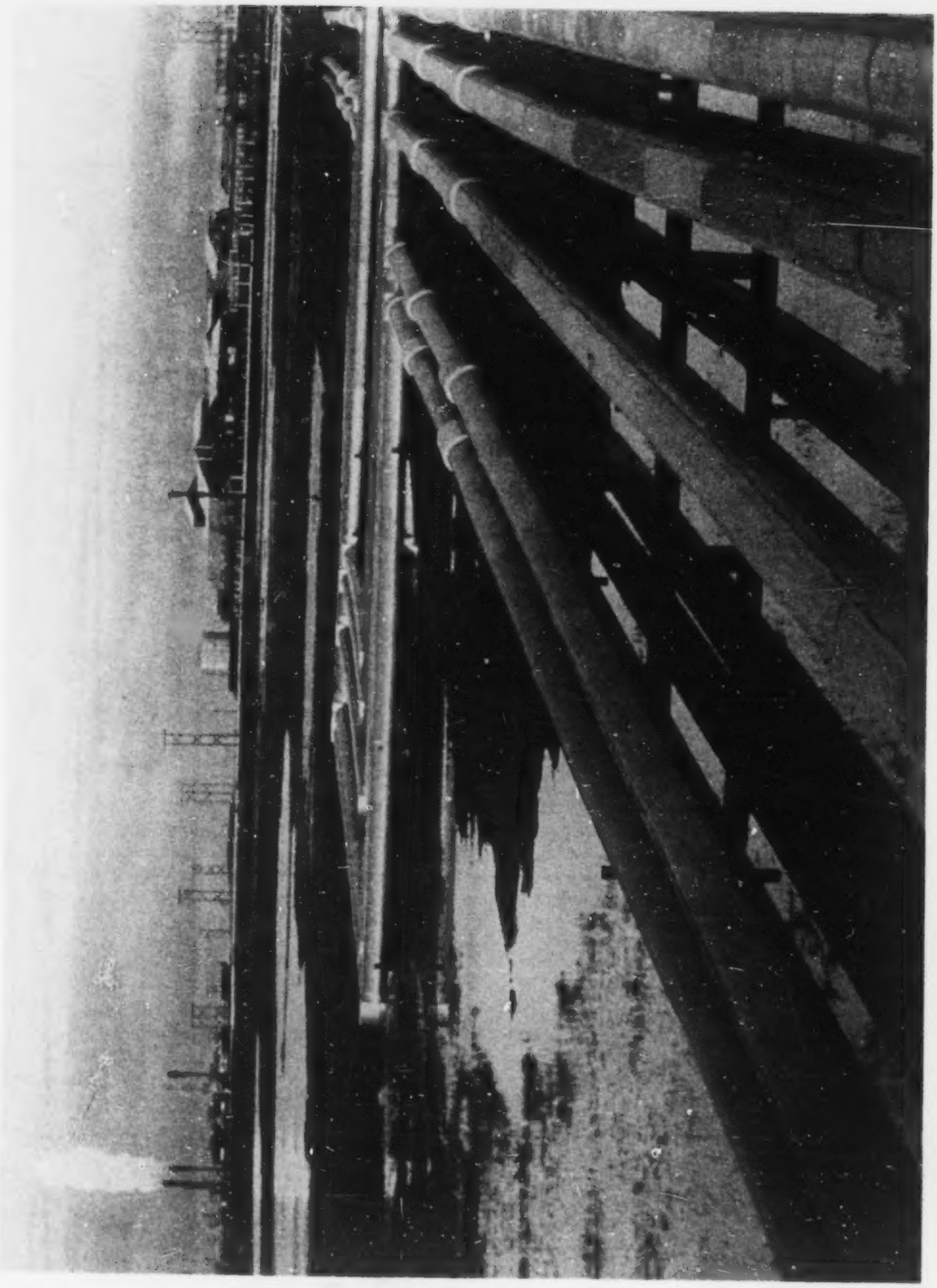
The fundamental conflict is between the possibility of finding oil and gas reserves in the Arctic coastal plain and the known values of a large and productive arctic ecosystem providing benefits important to native subsistence users, to citizens of several nations, and to a world-class National Wildlife Refuge set aside more than a quarter-century ago for all citizens of the nation.

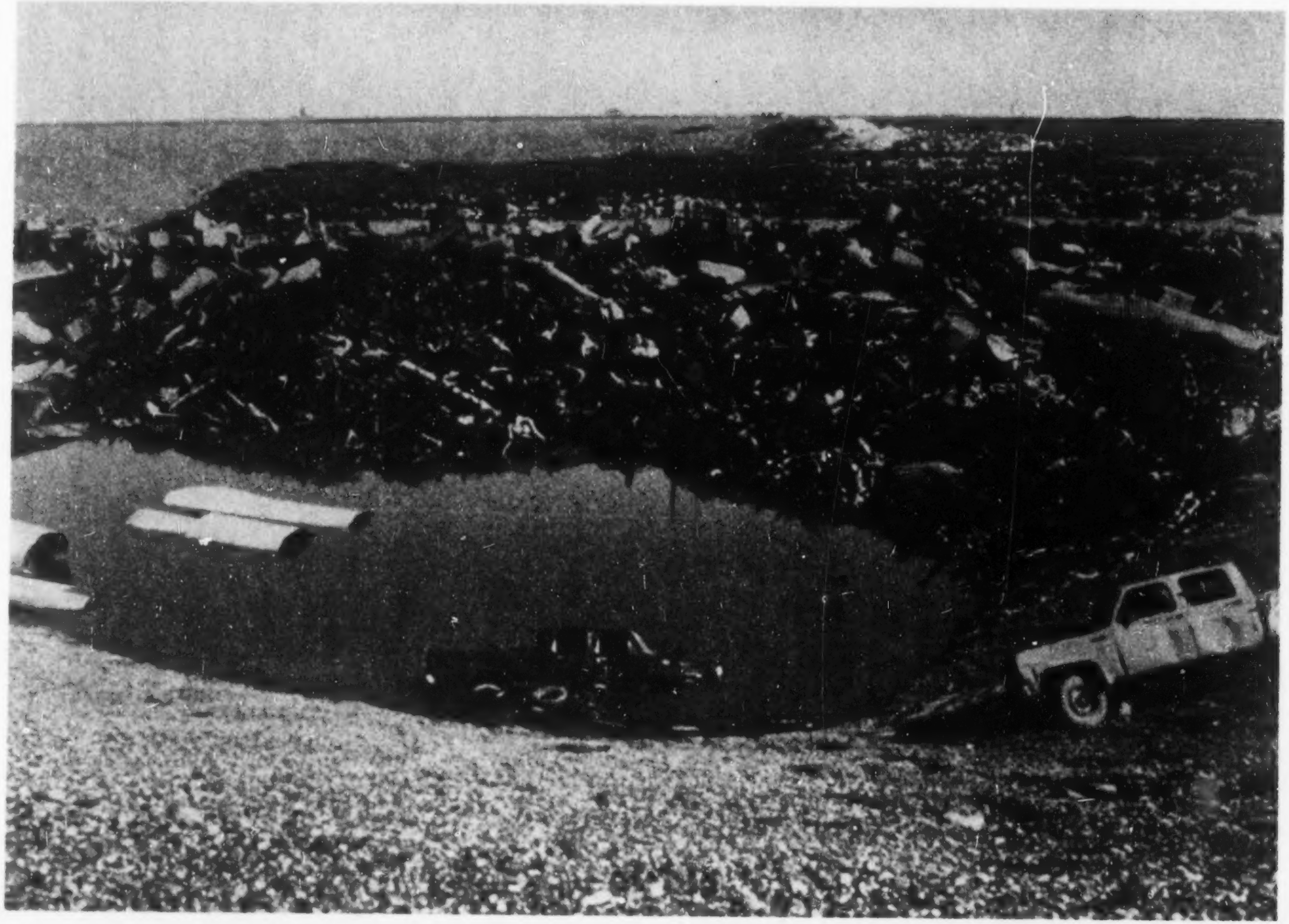
The National Wildlife Federation proposes legislation that would establish a nine-member Commission charged with the responsibility for reviewing the information presently available, securing additional information as necessary, and making a report and recommendations of its own to the Congress.

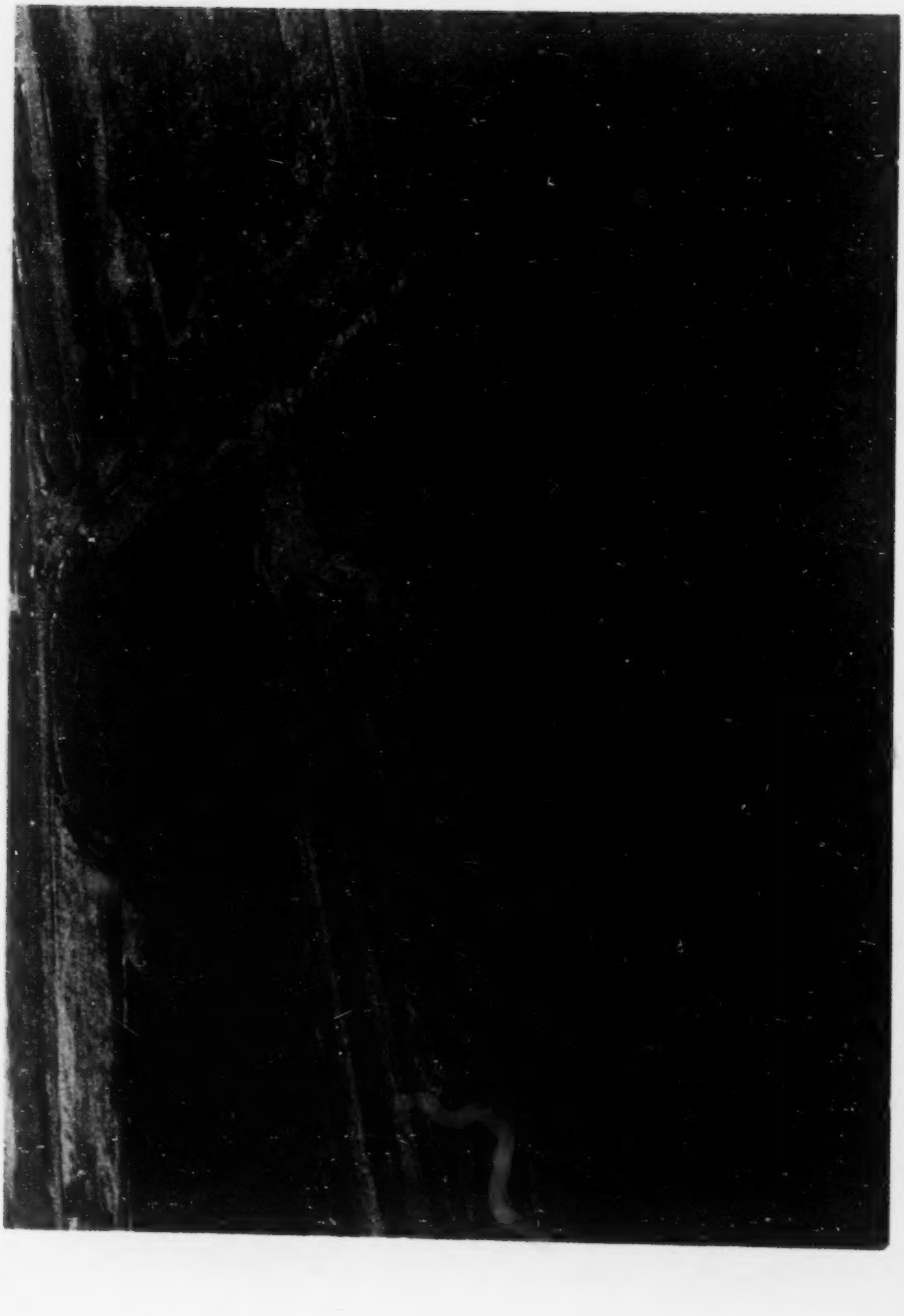
The National Wildlife Federation advocates an orderly, thoughtful, and scientifically-based consideration and recommendation, based on the accumulation of sound information.

The Federation recognizes, also, that there are parts of the study area of overwhelming value because of the natural resources involved, including the principal calving and insect-relief areas for the Porcupine caribou herd. We recommend this key part of the study area be set aside immediately as legislatively-designated Wilderness, to protect these irreplaceable resources, and to complement Wilderness designation already made of adjacent lands of the Arctic National Wildlife Refuge.

To summarize the arguments about oil leasing in the Arctic National Wildlife Refuge, let me make this observation: Americans are gamblers. We love beating the odds. But when it comes to our natural resources, we can't gamble with the irreplaceable. That must be our prime concern as we decide about development in the Arctic National Wildlife Refuge.







The CHAIRMAN. Thank you very much, Dr. Hair.

Next we will hear from Brock Evans, vice president for national issues of the National Audubon Society.

STATEMENT OF BROCK EVANS, VICE PRESIDENT FOR NATIONAL ISSUES, NATIONAL AUDUBON SOCIETY, ACCOMPANIED BY DR. JAN BEYEA, SENIOR STAFF SCIENTIST

Mr. EVANS. Thank you very much for the opportunity to be here and speak on behalf of the National Audubon Society.

I should add that I also have spent considerable time in Alaska and in Arctic Alaska up until the present but for many years. In the years 1973 to 1978, for example, I was a member, Mr. Chairman, of a special study team that was evaluating the environmental impacts of the Alaska oil pipeline and of the Prudhoe Bay developments.

And we traveled up and down the line there for those 5 years. I was in Prudhoe Bay before it was developed, while it was being developed, and after it was being developed to see all the effects. I like to feel I know a little bit about Arctic engineering and the problems that we face up there.

Also with me today is Dr. Jan Beyea. Dr. Beyea is our senior staff scientist, directs our energy policy programs, and helped a lot with this testimony. With your permission I would like him to sit here with us, because he may respond to energy questions, if that is okay.

The CHAIRMAN. Yes, please.

Mr. EVANS. Our policy, as hammered out by our board of directors after extensive discussions, is that the Coastal Plain of the Arctic National Wildlife Refuge should be managed and protected as wilderness, unless and only unless impartial scientific evidence demonstrates, first, that only the possible oil resources which might be found under the plain can meet our nation's energy needs, and second, that extraction activities there can be done without damage to the outstanding wildlife and wilderness values there.

That was our policy and it was adopted in February. Well, in all the debates and all the records and all the evidence since then, all the information, we think have come out overwhelmingly the other way.

We think it has shown that not only will the proposed leasing programs cause long-term and irreversible damage, cumulative damage to the wildlife and wilderness resources of the refuge.

But also, even if the Department of Interior's projections of a 7 percent chance of finding significant quantities of oil are realized, there are much better and cheaper and faster alternatives to supply it, to meet our nation's need to reduce dependence on foreign oil imports.

So that is why we are here on behalf of Audubon to urge most strongly that you take no steps to permit anyone to proceed with oil exploration or leasing and development activities.

There are two basic reasons why we say this, and I am just going to summarize the rest of my statement, Mr. Chairman, and highlight a few points here. One is that the Arctic National Wildlife Refuge is a national and international treasure.

We think the tremendous significance of ANWR as a world-class wildlife resource has already been well-documented. That is why it was created. That is why this Congress confirmed it. That is why the Canadians have a national park next to it.

Given the pace of development activities elsewhere in the high Arctic, we believe it is the only place there is a chance that such an undisturbed large ecosystem can survive into the future.

But I want to point out our strong feeling that ANWR is much more than essential habitat for many species of wildlife for all or part of their life cycle. We think this alone is reason enough for Congress to give it total protection.

But even more, ANWR as a whole, and especially the whole spectacular sweep of the sparkling mountains down past the foothills and the Coastal Plain make it a world-class wilderness and scenic resource as well.

Nowhere else on the planet are we going to find the same combination, the spectacular backdrop with the great caribou herd migrating back and forth in the pattern it has followed for thousands of years.

That is why, Mr. Chairman, that many observers have termed this combination the American Serengeti. And it is certainly the nearest thing we have in our nation to the great wildlife parks of east Africa.

There is certainly no doubt in my mind or our minds that ANWR, had it been located in any other state than Alaska, would have been created as an American national park long ago, because it is of that scenic and wilderness quality also.

So we maintain that we should no more consider breaching this scenic and wilderness magnificence for a 1 in 5 chance of finding anything at all, or a 1 in 14 chance of finding something significant, than we should, as my colleague Tim said, put dams in the Grand Canyon, which is a known energy source.

I point out also in my statement that in spite of repeated assaults on our great national parks over the last century by one commercial interest or another, only once, in the Yosemite National Park and Hetch Hetchy Dam in 1912, did Congress ever agree to open up a treasure like this once it had been protected as ANWR now is.

Another part of our feeling on this is that the values here at stake simply cannot be mitigated. We have heard a lot about the caribou and I talk about it in our statement. But I want to make it plain as others have that caribou are not the issue here as far as we are concerned.

The issue is wilderness and wildlife in its wild setting, a setting the likes of which there is not anywhere else. And since the intent of any proposed leasing program is to achieve large-scale development, we take a look in our statement of some of these impacts.

We conclude that it may be possible to mitigate some of the impact. But many questions, such as where the water is going to come from, where the gravel is going to come from, are not answered.

Dr. Hair pointed out very well, the pollution problems that exist. And I know from my own personal experience what it is like to try to do things in this very fragile, cold desert we call the high Arctic.

Even giving oil companies the benefit of the doubt, though, and assuming we have some development, and even assuming some portion of the wildlife will survive, it is the wilderness that will be destroyed.

And it is this combination, the wilderness and the wildlife together, that cannot be mitigated and cannot be put back together again.

It has been claimed that even if there is full-scale development of the plain, only a small part of it will be physically taken in terms of actual acreage, Mr. Chairman. To us that is like taking the famous Mona Lisa painting and ripping a scratch across the middle of it, and then saying, oh, we are only taking a little bit.

The damage that will be done if Congress permits this kind of industrial activity, and that is what it is, this is a large industrial development, it can never be undone. And I think we should face that fact as we try to make a decision.

The other part of our feeling on this is that we do not need to choose this way now. We have other alternatives. And I am going to hastily summarize some of the main points in our statement here.

We do not see any reason now to question other predictions that domestic oil production will decline in the next few decades. But the real question is not that. The question is, how should our policy respond?

There are many possibilities. But we believe that one of them is not opening up areas of great scenic or wilderness or wildlife quality, such as this wildlife refuge. Why? Because such a policy would risk great environmental damage while doing very little to actually reverse expected declines in domestic resources.

To document this fact we have collected some statistics, and they are reflected over there on the chart. They are also in a report, that I would like to offer here for the record if I could, our report titled, Oil And Gas Resources On Special Federal Lands, Wilderness, And Wildlife Refuges, because it does document what we are looking at here.

This shows the amount of oil estimated to lie in ANWR and all other U.S. wilderness areas combined. And included in this analysis are lands designated as wilderness by Congress, as well as those, like the Coastal Plain of ANWR, that are under study or proposed for wilderness designation.

And as you can see from the table, 3.9 billion barrels of oil are expected to lie under all those lands. Now these are risk-mean estimates, which take into account the odds that some geologically promising prospects will come up dry.

If the risk factors are ignored, which is the approach taken by the Department of Interior in its report on ANWR, the numbers can be made to look higher, and we show that they would be higher in my statement, maybe for a total of as much as 6.3 billion barrels if you use their figures rather than ours.

That sounds like a lot. But even this inflated number is small when compared to the total amount of oil projected to lie in other

U.S. lands. As shown in Table 1, 108 billion barrels are projected to lie outside of wilderness areas, either existing or potential.

And so thus the oil resources on those lands we believe must be kept untouched by development, to retain their special characteristics, come out to only about 7 percent of U.S. resources. Nine percent or so if the DOI figures are used.

Well, what happens if the oil companies then are kept out of this corner of the Arctic? Are we supposed to believe that they will not drill elsewhere? That they will leave all this remaining other oil untouched?

Certainly not. If they are kept out of ANWR, they may have to work a little harder, they may have to spend more money and explore greater acreage, they may have to take a few more years to get the same amount of oil to market. But they will.

We go on to document the fact that it is a very small part of our overall energy resources, and there are other ways to do it. For example, we document that a .25 mile increase in fuel economy of automobiles and light trucks above the market-induced level would save 600 billion barrels of oil over the 30 years that DOI claims that ANWR would be producing.

This savings equals the risk-mean estimate of oil expected in the Coastal Plain here, which just shows again how relatively insignificant the amount of oil is.

I point out on page 4, and also page 8, it is not like other oilfields do not exist. Three hundred billion barrels of oil are currently identified in the United States in existing fields, that can not be extracted under today's technology.

But if we could spend some money and some time to get new techniques of recovery, we think we could do a lot more here than we have already, and far more than at ANWR. On page 8 of my statement, we mention two other supergiant oilfields that are there to be exploited.

One is called the fuel-efficiency oilfield, which points out that if we begin to approach the automobile or fleet fuel efficiency standard of our allies in Western Europe and Japan, we could produce, and not just temporarily extract, about 5 million barrels a day.

The same thing we could do if we exploited the so-called weatherization oilfield, using relatively simple techniques of caulking and fixing up your storm windows and so on, you could produce 5 million more barrels a day that you do not have to use. This in fact is what some other countries are doing.

I just cite those as a couple of other alternatives that are here now, that are things that we have actually started to do. We have lots of facts and figures and numbers in them. I am not going to go into them all right now.

But we think all this is important. If we are going to develop a wise oil policy, Mr. Chairman, and a policy that is really going to protect our security and not drain our country first, we think it would be wise to look at what we can do and what we already have done since 1973 when they had the first oil shock.

I am not going to read it, but I draw your attention to the discussion on pages 5 through 8 of an alternative fuel that is now coming on to the market. And this is methanol. Much has been done technologically with methanol in the last few years.

The State of California especially has pioneered breakthroughs with flexibly-fueled vehicles, that is vehicles which can use either methanol or gasoline in the same tank and switch back and forth.

And I cite on page 6 the conclusions of the California Energy Commission, which said this is a viable substitute. Methanol substitution is a strategy that affords energy security and air quality benefits.

Basically it is coming along. It is here and it is going to be here even more. Again, pointing out in our view we do not need to rush to extract this place where there is so much controversy and so much adverse discussion about it when we have many other things we can do that all would agree upon.

I also point out on page 8 of my statement that other countries like Japan, whom we say we have to protect, and we want to, from oil shocks, are spending lots more money on energy research than we are, $816 million last year. And they have already come to dominate the world market in solar cell and superconductor technology.

Well, where does all this finally leave us? If we do have viable oil producing alternatives, can we do it? The answer is, yes. We have already been doing it.

When we were faced with a real oil crisis in the years 1973 to 1979, as opposed to the present oil glut situation, Congress and the Executive branch, with the support of the American people, did face up to the fact that we could not continue on our present energy course.

Congress responded, as we know, with a number of laws here, including environmentally protected laws at the same time. And the American people responded amazingly. By 1986 we had reduced the energy intensity of our gross national product by 25 percent, our oil and gas intensity by 36 percent, and drastically cut OPEC's share.

We have improved our overall energy efficiency in our economy by a staggering 24 percent, saving the equivalent of 5 billion barrels of oil in 1987 alone, or 14 million barrels of oil per day, which is 47 times the estimated potential annual contribution from ANWR. Most of this was done very straightforward.

But you know, I was there at the time. I was there in 1973, or here in 1974. And none of us was really sure that we could do it. In fact, I well remember the most respected energy expert in the early years of the crunch, a gentleman named Jack Bridges, who toured Capitol Hill with a very erudite presentation.

He stated that by the early 1980s we would need about 40 million barrels of oil equivalent from domestic systems, and if we kept imports and only doubled what they were in 1973, that would amount to another 10 or 15 million barrels of oil.

In other words, he said we would have to find 10 more Prudhoe Bays, or go somewhere and discover four more States of Texas and produce them at capacity. Well, we all know these predictions did not come to pass.

We now today consume just about the same amount of oil that we did in 1973, although with a much larger population, many more households, and a much larger industrial base and gross national product. And our imports have nowhere near doubled. In fact we import roughly the same amount as we did in 1973.

Let me summarize here quickly and answer, where does all this leave us? Number one, our conclusion is that the Arctic Wildlife Refuge is a world-class scenic wilderness and wildlife resource, in the same category as all the world's great national parks.

Number two, that no matter how carefully done any oil activity in this place, which leads to field development will irreparably damage for many lifetimes these qualities. There cannot be any meaningful mitigation in our view, Mr. Chairman.

Number three, because ample supplies of oil exist elsewhere under our own jurisdiction, these sources should be explored first, not last. The ANWR Coastal Plain should be about the last place ever entered in any search for oil, not among the first.

Number four, enormous opportunities exist to actually produce much more oil than could ever be found in ANWR, even by the most optimistic estimates. We have named a few of them.

At the present rapidly accelerating pace of energy technology, we have no doubt that many more opportunities will come to pass well before we could ever develop an oilfield here anyhow.

Fifth and finally, we feel we easily have the national capacity to take the measures to produce the oil, or its equivalent and to make this the conservation strategy a real centerpiece of an energy policy which actually enhances our security and does not drain our country first.

This policy would guarantee that we are ready for the time if and when we finally do run out of oil. So now is the time we urge to develop a real viable national energy policy, which can produce far more oil, far cheaper, and with no environmental damage. Thank you very much.

[The prepared statement of Mr. Evans follows:]

National Audubon Society

NATIONAL CAPITAL OFFICE 801 PENNSYLVANIA AVENUE, S.E. WASHINGTON, D.C. 20003 (202) 547-9009

STATEMENT OF BROCK EVANS
VICE PRESIDENT FOR NATIONAL ISSUES
NATIONAL AUDUBON SOCIETY
with
JAN BEYEA
SENIOR STAFF SCIENTIST
NATIONAL AUDUBON SOCIETY

BEFORE THE SENATE ENERGY AND NATURAL RESOURCES COMMITTEE
OVERSIGHT HEARING ON ISSUES CONCERNING PROPOSALS FOR OIL AND GAS DEVELOPMENT ACTIVITIES WITHIN THE ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

WASHINGTON, D.C.
JUNE 11, 1987

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Thank you for the opportunity to appear before you today and present the views of the National Audubon Society on this extremely important matter. Appearing with me today is my colleague Dr. Jan Beyea. Dr. Beyea, who assisted greatly in the preparation of this testimony and who has considerable expertise in energy-related issues, directs our environmental policy research programs and is available to respond to questions also.

Audubon's policy, as hammered out by our Board of Directors after extensive discussions earlier this year, is that the coastal plain of the Arctic National Wildlife Refuge should be managed and protected as wilderness unless -- and only unless -- impartial scientific evidence demonstrates that 1) only the possible oil resources which might be found under the plain can meet our nation's energy needs, and 2) extraction activities for them can be done without damage to the outstanding wildlife and wilderness values which the Refuge was created to protect.

Such evidence on these points has certainly not been forthcoming; in fact, all the debates, discussion, and information made available since last winter has come out overwhelmingly the other way. It has shown that not only will the proposed leasing programs cause long term cumulative and irreversible damage to the wildlife and wilderness resources of the Refuge, but also that even if the Department of Interior's projection of a seven percent chance of finding significant quantities of oil (3.2 billion barrels) are realized, there are better, cheaper, and faster alternatives to supply it to meet our nation's need to reduce dependence on foreign oil imports. Accordingly, Audubon is here today to recommend most strongly to you that you take no steps to permit anyone to proceed with oil exploration and/or leasing and development activities in ANWR.

Why do we say this? For two reasons. First, because of the enormous importance of the Arctic Wildlife Refuge to all of us, as a part of our American heritage and system of values; and second, because of the ready availability of alternatives to extracting oil from environmentally important areas.

The Arctic National Wildlife Refuge is a national and international treasure.

The tremendous significance of ANWR as a world class wildlife resource has already been well documented. That is why it was created by President Eisenhower in 1960, and expanded and given additional protection by this Congress in 1980. Together with the adjoining Canadian national park, it is the largest protected and relatively undisturbed arctic ecosystem any where on this planet. Given the pace of development activities elsewhere in the High Arctic, it is the only place that there is a chance that such an ecosystem can survive into the future, intact.

But ANWR is much more than just essential habitat for many species of wildlife for all or part of their life cycle. This alone is reason enough for Congress to give it total protection; but even more, ANWR as a whole, and in particular its spectacular sweep from the mountains, down past the foothills, and across the coastal plain, makes it a world class wilderness and scenic resource as well. Nowhere else on this planet can we find quite the same combination of high sparkling mountains as a backdrop to the narrow coastal plain with the great caribou herd migrating back and forth upon it in the same ancient pattern it has followed for thousands of years . . . all in a wilderness setting. Many observers have termed this combination "The American Serengeti," and it is certainly the nearest thing we have in our nation to the great wildlife parks of East Africa. There is no doubt in our minds that ANWR, had it been located in any other state than Alaska, would have been created as a national park long ago. It is of that scenic and wilderness quality.

We maintain that we should no more consider breaching this scenic and wilderness magnificence for a one-in-five chance of finding anything at all, and a one-in-fourteen chance of finding something significant, than we should put dams in the Grand Canyon -- a known energy source. What is at stake here is simply too significant to the values that the American people have historically placed their such scenic, wilderness, and wildlife resources. In spite of repeated assaults on our great national parks over the past century by one commercial interest or another, only once -- at Hetch Hetchy in Yosemite National Park in 1912 -- did Congress ever agree to open up a treasure of this caliber.

The values at stake at ANWR are of such a nature that they cannot be mitigated.

We have heard much about the small (about 13,000 animals) Central Arctic Caribou Herd, and how this herd has actually increased in numbers, despite the development of Prudhoe Bay and the Alaska oil pipeline -- as if this somehow is any indication of the impact that a large scale industrial development in the much narrower coastal plain of ANWR would have on the much larger (180,000 animals) Porcupine Caribou Herd. Many commentors have now pointed out the fallacy of these attempted comparisons, a key difference being that the ANWR coastal plain is much narrower. This means that industrial activity there is much more likely to displace existing caribou and cause intolerable overcrowding and damage to its crucial calving grounds. Even ignoring the fact that there have been adverse impacts on the CAH (e.g., calves and cows are especially sensitive to human activity and avoid development activities at calving time), caribou are not the issue here. The issue is wilderness, wildlife in its wild setting, a setting the likes of which there is nowhere else.

Since the intent of any proposed leasing program is to achieve large scale development, therefore we must look at these consequences if we are really to analyze what the overall impacts will be. Other witnesses will speak to you about the air and water pollution that has occurred at Prudhoe Bay, contrary to claims that this is somehow a "clean" operation. The fact is that an oil or gas field, with its seaports, drilling pads, compressor and pump stations, workers' facilities, haul roads, and pipelines, is an industrial operation; no matter how carefully done, it will have large scale adverse noise, air, water, and visual pollution impacts.

It may be possible to mitigate some of these impacts, although there is not any evidence yet that sufficient water supplies would be available to both build ice roads and still protect overwintering fish populations; and it may be possible to do a better job of controlling air and water pollution than was done at Prudhoe Bay. We doubt it, but even giving oil companies the benefit of the doubt, and even assuming that some portion of the wildlife will survive, it is the wilderness that will be destroyed. And it is this combination -- of wilderness and its wildlife together -- that cannot be mitigated, and cannot be put back together again.

It has been claimed that even if there is full scale development of the plain, only a small part of it, in terms of actual acres, will be physically taken. That is like taking the famous Mona Lisa painting, ripping a scratch across the middle of it, and then claiming that we are taking only a little bit. The damage that will be done if this Congress permits such industrial activity can never be undone; we must face that fact.

ANWR oil in perspective: We do not need to choose now.

Audubon sees no reason to question other predictions that domestic oil production will decline over the next few decades. The question is, how should U.S. policy respond? There are many possibilities; but one of them is not opening up areas of great scenic, wilderness, and wildlife quality such as this famous wildlife Refuge.

Such a policy would risk great environmental damage, while doing little to reverse expected declines in domestic resources. To document this fact, we have collected statistics on locations where the United States Geological Survey and other analysts expect future oil to be found in the United States. This work, a copy of which is attached for the record, appears in Annual Review of Energy.[1/] The essence of the Report is that the great bulk of U.S. oil and gas resources are expected to be found outside places like ANWR.

Table 1, adapted from the report, shows the amount of oil estimated to lie in the ANWR and all other U.S. wilderness areas combined.[2/] Included in the analysis are lands designated as wilderness by Congress as well as those, like the coastal plain of ANWR, that are under study or proposed for wilderness designation. As shown in the Table, 3.9 billion barrels of oil are expected to lie under these lands. Note that the numbers given here are so-called "risked mean" estimates, that is, they take into account the odds that some geologically promising prospects will come up dry. If risk factors are ignored (the approach taken by the Department of Interior in its report on ANWR), the numbers can be made to look higher. For instance, if we had used the 3-billion-barrel figure assigned by the Department of Interior to ANWR (for which it admits there is only a 19 percent chance of being correct), the total amount of oil projected to lie in potential and designated wilderness lands would have been 6.3 billion barrels.

Sounds like a lot. But even this inflated number is small when compared to the total amount of oil projected to lie on other U.S. land. As shown in Table 1, 107 billion barrels are projected to lie outside of wilderness areas, either existing or potential.[3/]

Thus, oil resources on those lands that must be kept untouched by development to retain their special characteristics amount to only 7 percent of U.S.

resources (9.2 percent if the DOI figures are used). No wonder some supporters of opening up the ANWR are tempted to inflate the amount of oil that is likely to be found there. We take their willingness to play games with the numbers as an indirect admission that their case is otherwise embarrassingly weak. (We find it embarrassingly weak even with inflated numbers.)

What happens if the oil companies are kept out of this corner of the Arctic? Are we supposed to believe that they will not drill elsewhere--that they will leave all this other remaining oil untouched? Certainly not. If kept out of ANWR, oil companies may have to work a little harder, they may have to spend more money and explore greater acreage, they may have to take a few more years to get the same amount of oil to market; but get the oil they eventually will.

Because the percentage of potential oil in ANWR and other wilderness areas is so small relative to the total, the exploitation of these lands would make only a small perturbation on the U.S. oil situation. To allow ourselves to be distracted by disputes over such relatively insignificant blocks of resources can only delay development of a meaningful energy policy. For instance, a 0.25 mile-per-gallon increase in fuel economy of automobiles and light trucks above the market-induced level will save 0.6 billion barrels of oil over the 30 years that DOI claims that ANWR could be producing. This savings equals the risked mean estimate of oil expected in the coastal plain of ANWR,4/ which shows how relatively insignificant the expected amount of oil is in the coastal plain.

Other proven oil fields now exist.

It is not as if there is not other oil, in known reserves, in the ground right now, within the boundaries of our country. It is there, and not being extracted simply because of market conditions, not because it does not exist. About 300 billion barrels of oil are currently identified in the United States that cannot be produced with today's technologies, according to the Department of Energy. This figure represents over ten times our current level of oil reserves. Even a small improvement in recovery techniques could yield many billions of barrels in fields that are already known. Why not improve techniques of recovery in locations where we are certain there is oil, before we venture into fragile frontier zones where the potential for damage is immense, and we are not even certain that oil exists?

It is also interesting to note that while on the one hand the oil industry is pushing hard for the opening of this Wildlife Refuge, they are shutting operations down elsewhere in Alaska. Over the past six months, eight of the twelve major oil rigs in the Cook Inlet have remained idle. Pool Arctic had five rigs working last March, but is now down to one. This company, which had almost 300 people working earlier this year, has had to cut its staff to less than 140. The same drastic decline in drilling or exploration activity is true elsewhere through Alaska, including Prudhoe Bay itself. The reason is not because there is no oil to be found or extracted; it is because it is not economic in the current oil glut.

We find further irony in this situation, when on the one hand, supporters of exploiting ANWR say its oil will help ease the dependence on foreign oil, then on the other, some of the same companies lobby this body hard to repeal the oil export ban on North Slope crude. We have recently learned that the U.S. Department of Commerce has issued an oil export license for Cook Inlet crude to ARCO Alaska, Inc. Now, ARCO is looking for buyers for 600,000 barrels a year. And just recently, the governor of Alaska, who is pushing to open ANWR, also lists as a point of his agenda, the goal of lobbying hard to remove the export ban on North Slope crude. No doubt, the explanations for this apparent anomaly will be something like "there is a world market," or "we are only doing it to help our allies . . . ." But we believe that at least we should tell the truth here and admit that oil export is one of the goals.

If reduction of dependence on foreign oil is the policy goal, there are far cheaper, faster, and safer alternatives.

Even if the Congress finally makes the policy determination to sacrifice the wilderness of the coastal plain for that seven percent chance of finding a significant oil field, and even if we finally agree to use it all in our home markets and not for export, we still should consider that it will be much cheaper and safer to provide equivalent oil elsewhere. Many alternatives exist.

For example, to save three billion barrels of oil over the 30 years that DOI claims ANWR could be producing, only a 1.7 mile per gallon improvement in fuel efficiency over the market will be needed.5/ And this saving would be achieved, not with a 19 percent chance of success, but with a 100 percent chance of success.

Congress is going to spend a great deal of time debating the fate of ANWR over the next few years--time that would be far more effectively spent hammering out legislation aimed at improving fuel economy through research or standards. Unfortunately, improvements in fuel economy could have a negative economic impact on oil companies, so it is no surprise that they would prefer to focus attention on ANWR.

But, if the rest of us are to prepare ourselves sensibly for the coming decline in domestic oil production, the Congress must concentrate its attention on those policy areas where broad agreement is both meaningful and possible. A protracted and bitter battle over ANWR and other spectacular places is likely to prevent the very consensus necessary to solve our real oil problems.

To develop a wise oil policy, it is first necessary to take a realistic look at the likely future of transportation. What can be expected if the world runs out of oil? Will our automobiles and trucks stop in the streets? Hardly. As the price of gasoline increases, the marketplace will gradually bring into use more efficient vehicles and some combination of alternative transportation fuels such as methanol, ethanol, electricity, liquified natural gas, and possibly hydrogen. Alcohol fuels, like methanol and ethanol, have the great advantage that, with relatively minor engine modifications, they can be mixed with gasoline in arbitrary combinations. Ford Motor Company, for instance, has incorporated and improved upon a device developed in Holland which senses methanol, gasolinc, or any combination of the two, and automatically adjusts the engine's fuel system to run properly.[6] The development of the "flexibly-fueled" vehicle is a technological breakthrough that gives alcohol fuels the potential to smoothly merge into and eventually dominate the transportation market whenever economic conditions should warrant.

Experience with methanol vehicles in California has proved their practicality. Here are some relevant quotes from the California Eenergy Commission's evaluation report:

> "Methanol is a viable substitute for both gasoline and diesel fuels...."
>
> "...methanol substitution is a strategy that offers both energy security and air quality benefits."
>
> "...methanol-fueled, heavy-duty engines can match the performance and energy fuel economy of diesel engines, plus offer a strategy for meeting stringent new emissions regulations."[7]

Of the alcohol fuels, only methanol has the potential to be produced in quantities large enough to power the current crop of automobiles, with their modest fuel economies. It is for this reason that most energy analysts are currently focusing on methanol rather than ethanol. Methanol is routinely produced from natural gas around the world today at prices that are comparable to gasoline on an energy basis, so no radical transitions in costs will be expected as long as the world's supply of natural gas lasts. How long will U.S. supplies of natural gas last? As shown in Table 1, the United States has even more natural gas than oil. This means that, in effect, the development of practical methanol vehicles has vastly increased our transportation reserves. An especially exciting aspect of the use of natural gas as a vehicle fuel is the fact that energy conservation applied to natural gas consumption in residences and industry will now have the added benefit of extending domestic transportation fuels and improving our national security.

The costs of producing methanol from coal and biomass, as well as the acceptability of the environmental impacts, are more speculative, and therefore it is difficult to know which fuel -- methanol, hydrogen, or electricity -- will dominate the transportation picture beyond, say, the year 2030. But the major fuel will most likely not be oil, so that future generations will probably not be tempted to exploit ANWR.

The transition to alternative fuels will take place without crash government programs such as the ill-fated Synthetic Fuels Corporation. The government can, however, take modest steps to smooth the transition. For instance, a rule that would require future gasoline storage tanks in gas stations to be capable of storing methanol and gasoline would be very helpful. It would remove a major obstacle to future widespread use of methanol. In addition, the federal government could extend the pioneering work done by California and use its fleet purchasing power to purchase flexible-fueled vehicles. In this way, valuable data would soon be obtained on methanol performance in regions of the country with varying climates and terrain.

What about the environmental implications of methanol? When derived from natural gas, methanol has great advantages compared to gasoline. The same is probably true for methanol from biomass, although there is a paucity of data available to make a firm judgement at this time. Production of methanol from coal, however, definitely presents a serious long-term threat to the environment because of risks to the global climate from the greenhouse effect. The problem is that there is just too much coal. Once hooked on coal-based methanol, the world would have a difficult time getting unhooked and too much carbon dioxide would concentrate in the atmosphere. What makes the problem so insidious is the fact that there is a long delay projected between the time carbon dioxide is released and the resulting global temperature increase. There will be little visible warning before damage becomes inevitable. Because of the greenhouse effect, we at National Audubon are opposed to the use of coal-based methanol, just as we are opposed to the long-term use of coal in utility boilers. We believe it essential to do the research today that will be necessary to allow the world to escape from reliance on coal in the next century.[8] In any case, the debate over carbon dioxide and fossil fuels has nothing to do with opening up the Arctic National Wildlife Refuge: consumption of oil also produces carbon dioxide and exacerbates the greenhouse effect.

What about the national security implications of a gradual switch to methanol? Methanol has the advantage that natural gas is available in more countries than is oil, thereby reducing national security concerns about foreign dependence. Nevertheless, the methanol that will be consumed in American vehicles in the 1990s and early 2000s will be a mixture of domestic and foreign products. Neither methanol nor a strategy of opening up ANWR will by itself solve potential security threats from supply interruptions.

Thus, we are going to have to look elsewhere to reduce concerns about rising imports of transportation fuels. Why not concentrate on policies that have the potential for broad public support? A good example would be filling the Strategic Petroleum Reserve (SPR), perhaps increasing it to one year's supply of imported OPEC petroleum. Today, there are about 0.5 billion barrels of oil in the SPR, while we import about 2 billion barrels per year, nearly half of which comes from OPEC.[9]

Interestingly, the encouragement of flexible-fueled vehicles and methanol-ready gasoline storage tanks, before methanol comes into broad use for market-induced reasons, can dramatically increase the value of a strategic petroleum reserve. With vehicles in the fleet capable of using methanol, it would be feasible to build new methanol plants on an emergency basis while the strategic reserve was being drawn down. In fact, with flexible-fueled vehicles it becomes feasible to conceive of an emergency system that would completely insulate the United States from a foreign cutoff. During the first stage of the emergency, reliance would be placed on the strategic reserve. During the second stage foreign oil would be replaced with methanol from hastily-built plants. During the final stage, two-to-five years after the interruption, emergency conservation measures and fuel switching would help to bring the economy back to normalcy. (The Office of Technology Assessment (OTA) estimated in its study on oil replacement that emergency energy conservation and fuel switching measures could reduce imports by 1-to-3.6

million barrels of oil per day, but they would take two-to-five years to implement.[10] Methanol could provide the bridge between the SPR and the measures identified by OTA.)

Of course, from a security perspective, the United States has to be concerned about the oil-security of its allies as well as its own level of imports. But there is no reason that our allies couldn't follow a similar strategy. In fact, Japan, our most vulnerable ally, is spending $816 million on energy research, and has already come to dominate the world market in solar cell and superconductor technology.[11]

Audubon is not arguing that there will never be a need to respond to a supply interruption lasting several years. But if Congress is worried about such an event, there does appear to be a reasonable strategy available to deal with the problem. And it is a strategy that both industry and environmentalists should be able to support.

Large and only partially exploited American "oilfields" already exist.

The "fuel efficiency oil field" mentioned earlier, could -- if we begin to approach the fuel efficiency standard of our allies in western Europe and Japan -- be capable of sustainably producing (not just temporarily extracting) over five million barrels of oil per day at a cost of just a few dollars per barrel. Another such "super giant oil field" also exists inside the boundaries of our country. This is the so-called "weatherization oil field" of oil and natural gas fungible for oil, which could be saved by basic insulation, reglazing, and weatherstripping of American buildings.

In fact, we were already well along the way toward doing both by the time this Administration began its efforts to dismantle conservation programs. We now have a 37 percent more efficient car fleet than we did in 1973, and in spite of the fact that we have 21 percent more households now than then, those same households use no more oil than we did 14 years ago. A detailed federal assessment of the practical potential for raising energy productivity found in 1981 that it would be very cost effective to fuel, in the year 2000, an American economy 80 percent larger than that of 1977, with 22 to 29 percent less fuel than was actually used directly (excluding that used to make electricity) in 1977.[12] That is, more, bigger and more fully equipped and comfortable buildings could by 2000 be using 58 percent less total direct fuel than in 1977; industry could add 48 percent more value by using six percent less fuel; and transportation could increase by 30 to 70 percent for personal driving, 60 to 90 percent for personal air travel, and 80 percent for freight, while transportation fuel needs actually dropped by 15 to 35 percent.

Even these potential savings estimates were quite conservative at the time, and now we see that energy saving technologies are entering the market so quickly that most of today's best electricity-saving devices, for example, were not even on the market a year ago. Because of this acceleration in technology, it is now about six times as cost effective to save energy as it was five years ago.[13]

Even if viable alternative oil producing opportunities exist, can we do it?

The answer is, absolutely yes! In fact, as noted above, we already have been doing it. When we were faced with a real "oil crisis" in the years 1973 - 79 (as contrasted with the present oil glut situation), the Congress and the Executive Branch, with the support of the American people, did face up to the fact that we could not continue on our present energy course. Congress did respond, with laws to lower speed limits, increase daylight savings time, provide tax incentives for weatherization, and require higher auto efficiency standards. The Congress also, wisely, established a Strategic Petroleum Reserve and, at the same time as it encouraged use of other domestic resources, provided environmentally protective measures, such as the Surface Mining Act of 1977, and the Outer Continental Shelf Lands Act of 1978.

And the American people responded to these policies and to market forces in an amazing manner: By 1986, we had reduced the energy intensity of our gross national product by 25 percent, our oil and gas intensity by 36 percent, and drastically cut OPEC's market share. Since 1973, the overall energy efficiency of the U.S. economy has improved by a staggering 24 percent, saving the equivalent of 5 billion barrels of oil in 1987 alone -- or 14 million barrels (of oil or its equivalent) per day.[14/] This is 47 times the estimated potential annual contribution from ANWR. And most of this was accomplished by straight forward improvements in fuel efficiency and weatherization techniques.

But at the time -- and I was there -- none of us was really sure that we could do it. In fact, the most respected energy expert in the early years of the crunch (1973 - 74) toured Capitol Hill with an erudite presentation, stating that by the early 1980s, we would need about 40 million barrels of oil equivalent from domestic systems, and if we kept imports at only double what they were in 1973, that would amount to another 10 to 15 million barrels of oil. "In other words," he said "we have to find 10 more Prudhoe Bays, or go somewhere and discover four more states of Texas and produce them at capacity."[15/]

In fact, these dire predictions did not come to pass. We now today consume just about the same amount of oil as we did in 1973 -- although with a much larger population, many more households, and a much larger industrial base and gross national product. Moreover, our imports have nowhere near doubled; today we import roughly the same amount of oil as we did in 1973 -- and far more of our imports come from non-OPEC countries. And we have done this without discovering 10 more Prudhoe Bays or even one more state of Texas!

CONCLUSION

Where does all this leave us? It leaves us with several very basic and simple conclusions:

1. The Arctic National Wildlife Refuge, particularly its wildlife-rich coastal plain in such a spectacular setting, is a world class scenic, wilderness, and wildlife resource. These resources are in the same category as any of the world's great national parks.

2. That no matter how carefully done, any oil activity in this place, leading to field development, will irreparably damage, for many lifetimes, these qualities. There simply cannot be any meaningful mitigation of the resources damaged or destroyed here because of their unique nature.

3. Because ample supplies of oil elsewhere under United States jurisdiction exist, these sources should be explored first, not last. The ANWR coastal plain should be about the last place ever entered in any search for oil, not among the first, as is proposed here.

4. Enormous opportunities exist to actually "produce" much more oil than could ever be found in ANWR, even by the most optimistic estimates. We have named a few of them: better fuel efficiency standards, weatherization, and a switch to alternative fuels such as methanol. At the present rapidly accelerating pace of energy-saving technology, we have no doubt that many more opportunities will come to pass well before any oil field could be developed.

5. We easily have the national capacity to take measures to produce the oil, or its equivalent, and to make this the centerpiece of a real energy policy which actually enhances our security and does not drain our country first. Such a policy would guarantee that we are ready for the time if and when we finally do run out of oil. If we follow this policy, we will have something left.

Now is the time then, to develop a real and viable national energy policy . . . one which can produce far more oil, far cheaper, and with no environmental damage. This is the policy we urge today and from now on.

1/ J. Beyea, Alex Stege, "Oil and Gas Resources on Federal Lands: Wilderness and Wildlife Refuges," Annual Review of Energy, 11, 1986, p .143.

2/ The basic figures for wilderness areas have been taken from a study commissioned by The Wilderness Society, almost all of which we have been able to update and double check against a study carried out by USGS.

3/ These estimates are based on USGS and Minerals Management Service data, as updated in Ref. 1.

4/ Assuming 112 million automobiles, 34 million light trucks, with a combined 1987 average fuel economy of 20.7 miles per gallon, consuming 2.1 billion barrels of oil per year. Market induced fuel economy is assumed to increase at such a rate as to balance increases in total miles driven per year. 1987 new combined fleet economy is taken as 24.4 mpg. With these assumptions, a 0.25 mpg improvement above the market saves 0.61 billion barrels over the 30-year ANWR field life. It is assumed to take about four years to produce oil there once development is permitted. Data has been adapted from, 1) Craig M. Hanchey and Mary C. Holcomb, Transportation Energy Data Book, Edition 8, (Oak Ridge National Laboratory, Oak Ridge, Report ORNL-6205, 1985), and 2) Monthly Energy Review, January 1987

[5] With the same assumptions as in 4), a 1.2 mpg improvement saves 3 billion barrels over the 30-year ANWR projected field life.

[6] Biologue, August 1986, p. 5.

[7] California Energy Commission, "California's Methanol Program: Evaluation Report," (Development Divsion, 1516 Ninth Street, Sacramento, California 95814) November 1986. All quotations are taken from the Executive Summary.

[8] Research is needed to reduce the costs of producing methanol from biomass. Research is also needed to reduce costs of vehicles powered directly or indirectly by electricity. (Solar sources of electricity, such as photovoltaics, should be viable replacements for coal-based electricity after the year 2000.)

[9] As of February-March 1987. (Monthly Energy Review, January 1987, p. 38-39.)

[10] Office of Technology Assessment, U.S. Vulnerability to an Oil Import Curtailment: The Oil Replacement Capability, September 1984, Figure 41, p. 121.

[11] Wall Street Journal, June 2, 1987, p. 26.

[12] Solar Energy Research Institute, A New Prosperity; Building a Sustainable Energy Future, Brick House (Andover, Mass), 1981, 462 pages.

[13] Testimony of Amory Lovins, Rocky Mountain Institute, before hearings on DOI Draft Report, January 1987, p. 3.

[14] Energy Security, Report to the President, U.S. Department of Energy, March 1987, p. 94.

[15]/ Jack Bridges, Center for Strategic and International Studies, quoted in Congressional Record, January 23, 1974, p. 678.

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Table 1

Estimated U.S. Oil and Gas Resources in Billions of Barrels of Oil Equivalent[a)]

	Petroleum	Natural Gas
Designated Wilderness (88.5 million acres)	1.6 (1.4%)	1.6 (1.1%)
Potential Wilderness (128 million acres, including the coastal plain of ANWR)	2.3 (2.1%)	2.5 (1.6%)
Other Onshore Federal Land (573 million acres)	19 (17.0%)	16 (10.8%)
Non-Federal Land	68 (61.1%)	99 (65.3%)
Offshore Areas	21 (18.4%)	32 (21.2%)
TOTAL	112	151

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a) Includes economically recoverable reserves and potential (undiscovered) resources. (Economically recoverable resources are those resources recoverable today or with foreseeable improvements in technology.) Risked mean estimates. Adapted from Ref. 2. Includes Alaska.

The CHAIRMAN. Thank you.

Finally, we have Randy Rogers, executive director of the Northern Alaska Environmental Center from Fairbanks, Alaska.

STATEMENT OF RANDY R. ROGERS, EXECUTIVE DIRECTOR, NORTHERN ALASKA ENVIRONMENTAL CENTER

Mr. ROGERS. Thank you.

Northern Alaska Environmental Center is the farthest north based conservation organization in the United States. Northern Alaska Environmental Center is dedicated to the protection of the wildlands, waters, and wildlife of interior and Arctic Alaska for the benefit of people and all other living things in the place that we call our home.

I am honored to speak before you today on behalf of thousands of Alaskans who believe there must be a balance between the development of Alaska's North Slope oil reserves and conservation of our unique wildlife and wilderness resources.

We believe to achieve that balance the Coastal Plain of the Arctic National Wildlife Refuge must be designated as wilderness.

I have just returned from a trip to the Arctic Refuge Coastal Plain, which unfortunately I had to cut short by a week in order to attend this hearing, where I sat on one of the foothills of Brooks Range and gazed across the Coastal Plain to the Arctic Ocean.

I can conclusively tell you that there is no other place in Alaska or perhaps the entire world where one can view such a variety of terrain, spanning from the tallest peaks of the Brooks Range to the Arctic Ocean, and simultaneously be amidst one of the richest wildlife habitats in North America.

This area is truly a unique American wilderness of international significance. The primary purpose for my trip to the refuge at this time of the year was to observe the migration and calving of the Porcupine caribou herd. Unfortunately, due to a late spring thaw in the refugee, the majority of the caribou calved in Canada's Northern Yukon National Park this year.

I would like to mention, though, that from my observations as just a hiker, there was some caribou calving within the refuge in the area where we were. They are extremely sensitive even to hikers, let alone major industrial development. These are the female caribou with their calves.

Since the release of the Department of the Interior's final 1002(j) report to Congress, a great deal of controversy has arisen over the deletion of the draft report's reference to a Porcupine caribou herd core calving area, with no new biological data accumulated between the draft and the final reports.

My recent trip to the Arctic refuge verifies that indeed the caribou do calf in high concentrations in different areas in different years. Nevertheless, the data accumulated over several years clearly shows that the Upper Jago River, which is an area in the southern portion of the Coastal Plain which has been identified by the Department of the Interior, at least in the draft report, as the "core calving area, 'is the area most heavily used for calving year in and year out.

Biologists do not know precisely what the effect of lack of access to this heavily used area for several concurrent years would be. With the normal variation in weather, it is highly unlikely that this area would be not accessible to calving caribou for several consecutive years.

Only through intensive industrial oil development would this area be unavailable to the caribou for a long period of time. Questions concerning what will happen to the caribou population under this scenario is the primary basis for the controversy over what impacts might actually occur to the Porcupine caribou herd.

What the U.S. Fish and Wildlife Service and the Alaska Department of Fish and Game biologists do know is that when caribou calf in Alaska there is a 90 percent calf survival rate through June, compared to a 58 percent survival rate when calving occurs in Canada.

The mortality rate of calves born outside the 1002 area is 1.7 times that of calves born within the 1002 area. That is approaching nearly twice the death rate of calves when they do not use the 1002 area.

These data irrefutably substantiate the habitat value and importance of the entire 1002 area to the Porcupine caribou herd, not just the core calving area identified in the draft 1002(h) report.

It should be noted that the Porcupine caribou herd does not have alternative calving habitat, like the central Arctic caribou herd in the Prudhoe Bay area.

Another important difference between these two caribou herds is that when crossing roads and pipelines the central Arctic caribou herd has really not been in aggregations exceeding 5,000 animals. In the Coastal Plain of the Arctic Refuge, there are commonly post-calving aggregations of caribou up to 80,000 animals. We really do not have any experience which shows how this size of a herd would deal with large industrial development.

The Porcupine caribou herd is the major wildlife and subsistence resource of the refuge. However, special significance of the Arctic Refuge lies in the fact that it is the only area where the full spectrum of Arctic habitats, from the interior boreal forest across the peaks of the Brooks Range to the Arctic coast itself, can remain protected.

Natural biological processes remain intact in this long protected sanctuary. I think it is important to compare this area and the opportunities there with Yellowstone National Park, for example, where even today we have problems with the elk herds that do not have their entire range covered. They are coming down into the Gallatin Valley in Montana, they get into the haystacks of ranchers.

We really do have severe problems with the grizzly bear population because we do not have an entire intact ecosystem.

The Arctic Refuge is the place where we can preserve this for future generations. One of the fundamental purposes of the Arctic National Wildlife Refuge which is delineated in the Alaska National Interest Lands and Conservation Act is the conservation of fish and wildlife populations and their habitats in their natural diversity.

Different biologists may speculate one way or the other about how much effect oil development will actually have on the Porcupine caribou herd. However, it is virtually certain that predators, a vital component of the ecosystem and the natural processes at play, will be lost. Wolves have been eliminated from the Prudhoe Bay area.

The final U.S. Fish and Wildlife Service baseline study report on the Coastal Plain states that: "Brown bears have historically not abandoned previously occupied areas when those areas were developed by man. Instead, bears continue to use the newly occupied areas and are eventually eliminated by killing because they pose a threat to human safety."

The final 1002 report acknowledges that a decline in local polar bear natality rate will occur, but states that this decline will not affect the overall population of polar bears "so long as similar intensive developments did not occur along the entire northern coast of Alaska and Canada."

In fact, similar intensive development has already occurred in many of these coastal areas and is proposed for further areas both on and offshore. It is almost certain that polar bears in the Beaufort Sea region will be adversely affected by the cumulative impacts of the industrialization of the area.

The 1002 report's failure to address these undeniable cumulative effects is one of its major flaws. It is difficult, if not impossible, to believe that a wildlife refuge which has been described as the crown jewel of the national wildlife refuge system would not have a single acre of land which is unique and irreplaceable on a national basis or in the ecoregion qualifying the area for resource category one under the U.S. Fish and Wildlife Service mitigation policy.

In addition to the core calving area which was listed as resource category one in the draft 1002 report, the caribou insect relief habitat along the coast, Snow Goose staging habitat, fish overwintering areas, onshore polar bear denning sites, and muskoxe calving habitat should all be afforded this high level of protection.

The 1002 report does not provide any reasonable explanation as to how these critical habitats can be protected or replaced if they are irreparably damaged by oil development.

It is obvious that the Department of the Interior has deliberately removed this protective category from its final report, irregardless of the biological data, because this designation might place limitations on oil development.

As the Congress considers the fate of the Arctic refuge Coastal Plain, we urge you to bear in mind that we are dealing with a national wildlife refuge, not multiple use state and Federal lands such as are found in the Prudhoe Bay area.

The policies and procedures utilized in the Prudhoe Bay area to minimize or mitigate environmental impacts are not necessarily adequate to protect the special values for which this refuge was established.

While the Department has chosen to simply state that "the oil industry's record at Prudhoe Bay has shown that oil development in the Arctic can be done in an environmentally safe manner," the Department has not closely examined this record except in the case of the increase of the population of central Arctic caribou herd, where the record appears to support their case.

Environmental protection stipulations have been very difficult to implement at Prudhoe Bay. The U.S. Fish and Wildlife Service final baseline report states that: "On North Slope oil fields, successful rehabilitation techniques have not yet been developed."

With regard to wildlife habitat mitigation, the U.S. Fish and Wildlife Service has found that it is not uncommon for recommendations to avoid or minimize impacts to be rejected as too costly or inconvenient by the industry, even though they are reasonable recommendations to implement. One needs only to look at far as Prudhoe Bay to see that even exploratory wells involve long-lasting damage to the natural character of the land.

In recent correspondence with the State of Alaska, the Alaska Oil and Gas Association identified stipulations which they feel are onerous or too costly. Among these stipulations are the prohibition on the dumping of drilling muds and cuttings, removal of drilling sites and rehabilitation of the site, and construction of pipelines to allow safe passage of caribou.

It is clear that the oil industry will make no effort to protect the wildlife habitat values of the refuge if it involves any additional costs. Further, if environmental protection measures are not spelled out by the Congress, it is doubtful that the Fish and Wildlife Service can withstand the political pressure of the oil industry to ensure proper implementation of existing environmental protection measures.

Several examples during the 1002 process have taken place, one being the drilling of the well on the Kaktovik-Inupiat Corporation lands, which continued later into the spring than was anticipated, and the caribou herd was arriving into its calving grounds.

The Fish and Wildlife Service was requested by our organization to ensure shutdown of that well under their authority under the Native Claims Settlement Act to manage those lands compatible with the refuge values. The formula that they came up with for determining the well shutdown would be when 5,000 or more caribou are within five miles of the well.

Well, this is fine, except for if you have caribou that close to that well they can be there that afternoon and, depending on the stage of development and the process of the drilling, it could take two weeks to shut that well down. So it was just a clear example of a mitigation measure that just would not work.

The United States is now presented with the unique opportunity to protect the full spectrum of Arctic ecosystems encompassing the range of a large migratory mammal herd in one intact unit. This is an opportunity which was foregone years ago by the bison herds—with the bison herds and wolves of the Great Plains, and which may never be available to the American people again.

With Canada's Northern Yukon National Park, protection of the Arctic National Wildlife Refuge can retain this opportunity for future generations of Americans and people worldwide.

Before the U.S. should consider exploiting all possible oil deposits in the Arctic Refuge, we must have a comprehensive energy policy in place which fully incorporates energy conservation and alternative energy sources. Congressional Representatives from States threatened with environmentally damaging outer continental shelf oil leasing programs must also demand a rational energy policy before coastal areas are irrationally damaged by oil development.

As part of this energy policy, we should fully develop and utilize new technologies to extract all possible oil from existing oil reserves, such as the proven multi-billion barrel West Sac sand deposit lieing idle on land already leased on Alaska's North Slope.

In summary, the Northern Alaskan Environmental Center endorses the comments made by Alaska's Senator Ted Stevens when he was testifying before the Council on Environmental Quality concerning the Arctic gas line proposed through Canada in 1977.

At that hearing, Senator Stevens stated: "These people would snake the pipeline from Prudhoe Bay across one of the great landscapes of the world, the Arctic National Wildlife Range. The line would then run across an equally breathtaking part of the world, the Northern Yukon, to Canada's MacKenzie Delta. Some have appropriately compared splitting the Arctic National Wildlife Range by a 48 inch pipeline and haul road with slicing a razor blade across the face of the Mona Lisa."

Of course, we are aware that Senator Stevens has not echoed——

The CHAIRMAN. Where is Senator Stevens?

Mr. ROGERS. I was hoping he would be here.

Of course, we are aware that Senator Stevens has not echoed this statement recently with regard to the 1002 area. It seems apparent that the Alaska Congressonal delegation is now seeking economic gain for multi-national oil companies in the State of Alaska, irregardless of national interest in Alaska's wildlands.

It is obvious that if the decision is made to allow oil development in the Arctic refuge, they will shift their efforts back towards eliminating the export ban on Alaskan oil. At this point, all arguments advanced by the Department on the national need for oil to achieve U.S. energy security through independence from foreign oil sources will be negated.

The Mona Lisa and the Arctic National Wildlife Refuge are both international treasures which we cannot afford to be sacrificed to political maneuvering. The short-term oil supplies which might be gained through development of the Arctic refuge do not outweigh the long-range benefits of permanent protection of a small portion of Alaska's Arctic Coastal Plain.

We wholeheartedly urge the Committee to designate the Arctic Refuge Coastal Plain as a component of the national wilderness preservation system.

Thank you.

[The prepared statement of Mr. Rogers follows:]

Northern Alaska Environmental Center

218 DRIVEWAY
FAIRBANKS, ALASKA 99701
(907) 452 5021

STATEMENT OF RANDY R. ROGERS, REPRESENTING THE NORTHERN ALASKA ENVIRONMENTAL CENTER, FAIRBANKS, ALASKA, BEFORE THE U.S. SENATE ENERGY AND NATURAL RESOURCES COMMITTEE, AT OVERSIGHT HEARINGS CONCERNING THE ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA, COASTAL PLAIN RESOURCE ASSESSMENT, JUNE 11, 1987.

Mr. Chairman and members of the committee, my name is Randy Rogers and I am Executive Director of the Northern Alaska Environmental Center, the farthest north based conservation organization in the United States. The Northern Alaska Environmental Center (NAEC) is dedicated to the protection of the wildlands and wildlife in interior and Arctic Alaska, for the benefit of people and all other living things in this place we call our home.

I am honored to speak before you today on behalf of the thousands of Alaskans who believe that there must be a balance between the development of Alaska's north slope oil reserves and conservation of our unique arctic wildlife and wilderness resources. We believe that to achieve that balance, the coastal plain of the Arctic National Wildlife Refuge must be designated as wilderness.

I have just returned from a trip to the Arctic Refuge coastal plain where I stood on a foothill of the Brooks Range and gazed across the coastal plain to the Arctic Ocean. There is no other place in Alaska, or perhaps the entire world, where one can view such a variety of terrain spanning from the tallest peaks of the Brooks Range to the Arctic Ocean and simultaneously be amidst one of the richest wildlife habitats in North America. This area is truly a unique american wilderness of international significance.

The primary purpose for my trip to the refuge at this time of the year was to observe the migration and calving of the Porcupine Caribou Herd (PCH). Unfortunately, due to a late spring thaw in the refuge, the majority of the caribou calved in Canada's Northern Yukon National Park this year.

Since the release of Department of the Interior's (DOI) final 1002(h) report to Congress, a great deal of controversy has arisen over the deletion of the draft report's reference to a PCH core calving area with no new biological data. My recent trip to the refuge verifies that indeed, the caribou do calve in high concentrations in different areas in different years. Nevertheless, the data accumulated over the several years clearly shows that the upper Jago River area is the most heavily used for calving, year in and year out. Biologists do not know precisely what the effect of lack of access to this heavily used area for several concurrent years would be.

With the normal variation in the weather it is highly unlikely that the upper Jago River would not be accessable to calving caribou several consecutive years. Only through industrial oil development would this area be unavailable to the caribou for a long period of time. Questions concerning what will happen to the caribou population under this scenario is the primary basis for the controversy over impacts to the PCH.

What the U.S. Fish and Wildlife Service (USFWS) and Alaska

Department of Fish and Game biologists do know is that when the caribou calve in Alaska there is a ninety percent calf survival rate through June compared to a fifty eight percent survival rate when calving occurs in Canada. The mortality rate of calves born outside the 1002 area is 1.7 times that of calves born within the 1002 area. These data irrefutably substantiate the habitat value and importance of the entire 1002 area to the Porcupine Caribou Herd, not just the "core calving area" identified in the draft 1002 Report.

The Porcupine Caribou Herd is a major wildlife and subsistence resource of the refuge. However, the special significance of the Arctic Refuge lies in the fact that it is the only area where the full spectrum of arctic habitats, from the interior boreal forest, across the peaks of the Brooks Range to the arctic coast itself, can remain protected. Natural biological processes remain intact in this long protected sanctuary.

One of the fundamental purposes of the Arctic National Wildlife Refuge which is delineated in the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) is the "conservation of fish and wildlife populations and their habitats in their natural diversity" (emphasis added). Different biologists may speculate about how much effect oil development will actually have on the PCH, however it is virtually certain that predators, a vital component of the ecosystem, will be lost.

Wolves have been eliminated from the Prudhoe Bay area. The final USFWS Baseline Study Report on the coastal plain states that "brown bears have historically not abandoned previously occupied areas when those areas were developed by man. Instead bears continue to use the newly occupied areas and are eventually eliminated by killing because they pose a threat to human safety." (USFWS 1986, p. 603).

The final 1002 Report acknowledges that a decline in the local polar bear natality rate will occur but states that this decline will not affect the overall population of polar bears "so long as similar intensive developments did not occur along the entire northern coast of Alaska and Canada." In fact, similar intensive development has already occured in many of these coastal areas, and more are proposed, both on and off shore. It is almost certain that polar bears in the Beaufort Sea region will be adveresely affected by the cumulative impacts of industrialization of the area. The 1002 report's failure to address these undeniable cumulative effects is one of its major flaws.

It is difficult, if not impossible, to believe that a wildlife refuge which has been described as the "crown jewel of the National Wildlife Refuge System" would not have a single acre of land which is "unique and irreplaceable on a national basis or in the ecoregion" qualifying the area for Resource Catagory 1 under the USFWS mitigation policy. In addition to the "core calving area" which was listed as Resource Category 1 in the draft 1002 Report, caribou insect relief habitat along the coast, snow goose staging habitat, fish overwintering areas, on shore polar bear denning sites and muskox calving habitat should all be afforded this high level of protection. The 1002 Report does not provide any reasonable explanation as to how these critical habitats will be protected. It is obvious that DOI has deliberately removed this protective category from its final recommendations, irregardless of biological data, because the designation might place limitations on oil development.

As the Congress considers the fate of the Arctic Refuge coastal plain we urge you to bear in mind that we are dealing with a National Wildlife Refuge, not multiple use state and federal lands such as are found in the Prudhoe Bay area. Policies and procedures utilized in the Prudhoe Bay area to minimize or mitigate environmental impacts are not necessarily adequate to protect the values for which the refuge was established. While the DOI has chosen to simply state that "the oil industry's record at Prudhoe Bay has shown that oil development in the Arctic can be done in an environmentally safe manner", the Department has not closely examined this record except in the case of the increase in the population of the Central Arctic Caribou Herd where the record appears to support their case. For example, despite over six years time to ensure adequate monitoring and evaluation of air pollution data from Prudhoe Bay, the Department made no attempt to obtain such data in order to scientifically evaluate potential air quality impacts which are likely to occur in the refuge.

Environmental protection stipulations have been very difficult to implement in the Prudhoe Bay area. We are not aware of a single drill site in the region which has been rehabilitated to anything approximating a natural condition. The USFWS Final Baseline Report states that "on north slope oil fields...successful rehabilitation techniques have not yet been developed." With regard to wildlife habitat mitigation the USFWS has found that it is not uncommon for recommendations to avoid or minimize impacts to be rejected as too costly or inconvenient even though they are reasonable recommendations to implement. One needs to look only as far as Prudhoe Bay to see that even exploratory wells involve long lasting damage to the natural character of the land.

In recent correspondence to the State of Alaska, the Alaska Oil and Gas Association (AOGA) identified stipulations which they feel are "onerous" or too costly. Among these stipulations are the prohibition on the dumping of drilling muds and cuttings, removal of drilling sites and rehabilitation of the site and, construction of pipelines to allow safe passage of caribou. It is clear that the oil industry will make no effort to protect the wildlife habitat values of the refuge if it involves any additional costs. Further, if environmental protection measures are not spelled out by the Congress, it is doubtful that the USFWS can withstand the political pressure of the oil industry to ensure proper implementaion of existing environmental protection measures.

CONCLUSIONS

The United States is now presented with a unique opportunity to protect the full spectrum of arctic ecosystems encompassing the range of a large mammal migratory herd in one intact unit. This is an opportunity which was foregone years ago with the bison herds and wolves of the great plains and which may never be available to the American people again. With Canada's Northern Yukon National Park, protection of the entire Arctic National Wildlife Refuge can retain this opportunity for future generations of Americans and people world wide.

Before the U.S. should even seriously consider exploiting possible oil deposits in the Arctic Refuge, we must have a comprehensive energy policy in place which fully incorporates energy conservation and alternative energy sources. Congressional representatives from states threatened with environmentally damaging Outer Continental Shelf oil leasing programs must also demand a rational energy policy before coastal areas are irrationally damaged by oil development. As part of this energy policy we should fully utilize new technologies to extract all possible oil from existing reserves, such as the proven multi-billion barrel West Sak sand deposit lying idle on land already leased on Alaska's north slope.

In summary, the Northern Alaska Environmental Center endorses the comments of Alaska's Senator Ted Stevens when he was testifying before the Council on Environmental Quality concerning the Arctic Gas natural gas pipeline proposal through Canada in 1977. At that hearing Senator Stevens stated:

> "These people would snake a pipeline from Prudhoe Bay across one of the great landscapes of the world, the Arctic National Wildlife Range. The line would then run across a equally breathtaking part of the world, the northern Yukon, to Canada's Mackenzie Delta.
>
> Some have appropriatly compared splitting the Arctic National Wildlife Range by a 48-inch pipeline and haul road with slicing a razor blade across the face of the Mona Lisa."

Of course, we are aware that Senator Stevens has not echoed this statement recently with regard to the 1002 area. It seems apparent that the Alaska Congressional delegation is now seeking economic gain for multi-national oil companies and the State of Alaska irregardless of the national interest in Alaska's wildlands. It is obvious that if the decision is made to allow oil development in the Arctic Refuge, they will shift their efforts back toward eliminating the export ban on Alaskan oil. At this point, all the arguments advanced by DOI on the national need for oil to achieve U.S. energy security through independence from foreign oil sources will be negated.

The Mona Lisa and the Arctic National Wildlife Refuge are both international treasures which cannot afford to be sacrificed to political manuvering. Short term oil supplies which might be gained through development of the Arctic Refuge do not outweigh the long range benefits of permanent protection of a small portion of the Alaskan arctic coastal plain. We wholeheartedly urge the committee to designate the entire 1002 area as a component of the National Wilderness Preservation System.

The CHAIRMAN. Thank you very much, Mr. Rogers. And thank you, gentlemen, for what has really been an excellent panel. If I had to grade the panel, I would grade it A-plus, except for Gaylord Nelson. We will give him an A for effort. [Laughter.]

He did the best with what he has to work with.

It is really an excellent panel and we appreciate it very much.

Let me take this opportunity to speak about my bill, S. 735. I know the position of not only this group, but all the environmental groups. My bill, S. 735, would of course say that we would use for land acquisition purposes 25 percent of the revenues from drilling on any wildlife reserve should that drilling be authorized.

And it would give that 25 percent over and above the average amount, and it would really dedicate it with an automatic dedication. And it would give that over and above the first $160 million, which would also be automatically dedicated, that $160 million being the average amount which has gone for land acquisition in the last seven years.

So that if the bill passed, you would get an automatic dedication of $160 million a year to the land and water conservation fund, the BLM, to the Forestry Service, and to the Agricultural Service for land acquisition; and over and above that, 25 percent of the revenues from not only ANWR, but any other wildlife refuge, if and when authorized.

Now, I know full well, every member of this Committee knows full well, that the entire environmental community strongly opposes and eloquently opposes any drilling on ANWR and any other wildlife reserve.

But let me tell you that S. 735 is not to be used, and I don't think it will be used by any member of this Committee and I do not think by any member of Congress, as a means, as a lever, as a wedge, to urge drilling on ANWR. But I can tell you that if we do not do this now, if we do not seek to get a share of it now, it will be too late if it should be authorized later on, because then you get—then it becomes part of Federal revenues.

Those revenues are projected, and OMB and indeed the Budget Committee will not let you have them, because then they are appropriated for defense or for a world of other, child nutrition or a world of other worthy or maybe not so worthy causes.

But if we can get this in the law now, put it in the law now and forget about it, and then deal with ANWR on its merits, completely separate and apart from that issue, because ANWR may indeed be an issue beyond this Congress. Perhaps this Congress will not allow it. It may be ten years from now it might allow it.

Who can say. But I ask you, not so much to support it, because I know you are so strong in opposition to ANWR that you will oppose S. 735. I would simply ask that you oppose it and then do not use your most persuasive of your persuasive powers to oppose it.

I would like to get that money for land acquisition purposes. Just as an aside, I can tell you right now we are in the conference on the budget, and we thought that the House and the Senate had a deal. But that deal has come unraveled, and the House has now submitted a counter-offer which cannibalizes another $400, $450 million, if I recall, out of the Interior Subcommittee jurisdiction, which I am the acting chairman of.

And as you know, the Interior Appropriations Subcommittee is where all the land acquisition money comes from. We do not have the money right now that we need, and if we get cannibalized another $450 million below last year's level, I mean, it is just unacceptable.

We cannot live with it. We do not have the money now to get those great acquisitions that we ought to be getting now. I mean, as you point out about oil, all the world's oil that ever will be, somebody said, is now in place. Well, all the world's land, all the United States' land that is ever in place, is now there.

And if it is developed, if you scratch that razor blade across the Mona Lisa, this is not the only Mona Lisa there is. So let us take our opportunity to get this while we have got a chance.

You do not have to comment on that. I guess, since I have got you here assembled, I just would simply say——

Dr. HAIR. Well, let me offer you a little encouragement, Senator. We are not opposed to certain aspects of your legislation. We very much would like to see the land and water conservation fund reauthorized as a dedicated trust fund.

I guess we are concerned about the source of funding. We think there is adequate revenues being generated from OCS areas. We would like to see any revenues that come off of refuges go back into the refuge system.

The CHAIRMAN. Well, the problem is that, while there is plenty of money being generated offshore, it goes into the general fund, or I guess it goes into the deficit. That is big enough to encompass everything, and you cannot get it out.

I mean, to put in a bill to have a real dedication of the land and water conservation fund, of OCS revenues to the land and water conservation fund, would be, if not laughed off the floor, it would at least not pass. And I want to get something that can pass, that is a real dedication, that will be a real source of money for acquisition, for future land acquisitions.

I mean, we have backed up, as all of you well know, with billions of dollars of authorization. You saw the Supreme Court decision of yesterday that may have very disturbing implications for the ability to manage our lands and to keep development off our lands.

So the pressure for money is going to be greater and greater and greater. So I say, let us get it while we can, and then put that issue aside and then consider ANWR on its merits, without reference to what the money would be used for.

Mr. MAHONEY. Mr. Chairman, may I add a couple of points to that?

The CHAIRMAN. Yes indeed, Mr. Mahoney.

Mr. MAHONEY. Beyond the points that you raised, if such legislation were to pass, even if the Congress were not influenced by it—and I know there would be certain parties that would try to use this legislation to try to influence you—I do think that if a future Congress down the road were examining what to do with the Arctic refuge, that they would face the additional pressures from an Office of Management and Budget that year after year as part of its budget message would attempt to push these revenues forward as a way to fund the land and water conservation fund, so that other moneys could be saved.

So that it would be used, at least by some Administrations, in the same way that, oh, fees, particular fee formulas have been proposed.

I guess the other——

The CHAIRMAN. Let me interrupt you there, to explain that S. 735 has a funding mechanism that dedicates the first $160 million automatically, and then the other 25 percent comes on top of that with an automatic dedication. So that OMB cannot control it, and even the Congress, the Congress would have to pass an Act.

Mr. MAHONEY. I am merely suggesting that the way the budget politics work with OMB is that they would see that as a way to save general appropriations and they would keep pushing this legislative proposal so that they could save general appropriations and put them into other places.

I guess the other——

The CHAIRMAN. Well, what they have been doing, see, is having $160 million is all the general appropriations we have been getting for that purpose.

Mr. MAHONEY. Yes.

The CHAIRMAN. So we give it, we dedicate the first $160 million, and then this is on top of that.

Mr. MAHONEY. Well, the other question I think that we have not focused on is, what is the effect on wildlife refuge management outside of the Arctic? We are all very fearful of how this might impact a political debate on the Arctic refuge system.

We do not know at the moment what the status is of other leasing programs in other refugees. And up until now, leasing in refuges has been determined if the Fish and Wildlife Service may find it compatible with the purposes of the refuge.

I think we would be very concerned with additional pressures being placed on the professional wildlife managers and the agencies to buckle under to leasing programs in other places where they may not truly feel it was compatible or appropriate.

The CHAIRMAN. I understand your concern there. But I can tell you that that does not change in my bill, that policy.

Mr. EVANS. Mr. Chairman, I am sorry to interrupt, but I would like to add a few things from my own personal experience. You were kind enough to discuss this with me at a luncheon some while back, and the idea of a dedicated fund to do this, especially in view of that disturbing Supreme Court decision, is important to us, too. And I know you know that and we appreciate your efforts here.

I wanted you to know that our feeling about this is not just because of the Arctic and the political debate we are in right now on that, but it goes deeper. And we have discussed it somewhat since, you and I and others have discussed it among ourselves.

And my own personal memories of this go back to about 1970, when the forest products industry then succeeded in getting bills introduced into the Congress which would create something like a national timber supply fund or a sustained yield fund.

And there the receipts from timber cutting, logging, would be automatically plowed back into the national forests and go back in this kind of a cycle.

We opposed it, after some thought, not because we did not want more money and good forestry. We do and we always do. But because we could see where this would lead in a very human sense. It would lead to the kind of pressure on the discussed forest managers that Mr. Mahoney mentioned to say: Well, we can cut a little bit more and a little bit more, because we are going to get more money right back again.

I think that would be the same human kind of concern, especially if we had an Administration like this one, which wants to do these things in any event. And we cannot know the vagaries of politics in years to come.

But I think you should know that it goes far beyond the Arctic question right now, and maybe we could discuss it later, but I wanted to say that now.

The CHAIRMAN. Let me ask one question and I will turn it over to my colleagues, because I took so much time lobbying my own bill.

And this is to anybody who would like to discuss it. There is, apparently, a peculiar fragility to the arctic wildlife range, that damage done does not recover as fast as it does in other areas.

Would someone like to discuss that in terms of why it does not, what happens to water, to oil spills, to air pollution, to any of those things?

Would someone like to discuss that?

Dr. HAIR. Well, I would be happy to. I am sure Randy can too.

As an ecologist who studied tundra ecosystems, it can be stated in a number of very simple terms.

One is that most of the seasons up there are extremely cold. You have frozen atmospheric conditions. You have the ground which is frozen much of the year. Of course you have permafrost.

You have very few frost-free days. All of the evolutionary biological processes in high arctic ecosystem is accelerated very rapidly. And you do not have the kind of ecological succession that you would have in more temperate zones like you would have here in the Washington, D.C. area.

The atmospheric conditions there are very different. The air is very cold. It is heavier. It does blow a good deal.

One of the concerns that we have, of course, is that the air quality permitting standards that are applied now to north slope operations are those standards developed for New York City and Los Angeles.

No one could rationally assume that they are approprirate for a high arctic ecosystem adjacent to a national wildlife refuge system and a wilderness area.

The CHAIRMAN. Is a given unit of air pollution worse in ANWR than it would be in the Gulf Coast, for example? And if so, why?

Dr. HAIR. Is a given unit?

The CHAIRMAN. I mean a given measure.

Dr. HAIR. Well, if you can compare equivalent amounts of atmospheric loading, an equivalent amount of pollutants going into it, it would be more significant, based on the different ways that warm atmospheres like you find off the coast of Louisiana would function versus how cold atmospheres would function.

The difference of course too is the prevailing wind currents. But we are not talking about just loading of the arctic atmosphere at Prudhoe Bay. We are talking about very significant industrial development around the entire circumpolar region.

And if you fly up there, you see this phenomenon called arctic haze. There is no question: there is pollution in the Arctic. There is no question that the majority of it seems to be coming from Russia and Northern Europe.

The CHAIRMAN. Is there any phenomenon such as the ozone depletion in Antarctica? Is there any similar kind of phenomenon up there?

Dr. HAIR. Oh, absolutely. You have ozone depletion typically occurring at the poles, both Antarctica and the Arctic.

The CHAIRMAN. Does that have any relationship to pollution, to ozone, to NOX?

Dr. HAIR. Well, you have ozone of two types, as you know, both atmospheric ozone, ground level ozone, that contributes to smog; and you have stratospheric ozone that contributes to the so-called greenhouse effect of the pollution of that ozone layer.

You have carbon monoxide being introduced. There are a number of issues associated with air quality that—I guess I could characterize it by simply saying, it is the theory of what we do not know will not hurt us in the practice of environmental management.

We really do not know. There has been one year of air monitoring on the north slope of Alaska in 1979. We base models on that that everyone now acknowledges underpredicts by a factor of two to five the environmental impacts.

It does not seem to be a very prudent and responsible course of action to allow even more development when we have not looked at what we are already doing, or we have tried to understand it in its cumulative effects around the circumpolar region.

The CHAIRMAN. I said that was the last question. Let me ask a related question.

Is the fishery up there of any peculiar nature or peculiar value?

Dr. HAIR. Well, I hope so, because I am going up there this summer to catch arctic char and grayling.

The CHAIRMAN. We are going to take the committee up there, but we are going to spend all our time at work; we will not do any fishing.

Dr. HAIR. I can help guide you to the right places, Senator.

I think you bring up very important issues. Because let us talk about a few of the fisheries issues and the water issue.

There is only one source—only one—source of freshwater on the arctic coastal plane, the so-called 1002 area, that is deep enough to over-winter fish, which is Sattleroche Springs.

This kind of activity is very freshwater intensive. Sure, you can build all kinds of lakes, and create ponds out in the permafrost, but it will have a very significant environmental impact.

But for the Department of Interior not to even mention fisheries in the report is the height of irresponsibility. The other fisheries issue that has got to be dealt with, that is now coming to light of having some significant concerns, are the causeways built over on the North Slope production areas that do affect fish migrations; that do appear to have an effect on fish population dynamics.

What has not been brought up today, and let me bring it up for the record because it is exceedingly important for this whole discussion, is that the State of Alaska and the Department of Interior will be going forward with leasing activities of the State territorial and the OCS areas in the very near future.

That is going to require some kind of access to those lease sites, if they are permitted. That is going to have a significant impact on those fisheries.

We think that fisheries are exceedingly important, and basically, have not been discussed at all.

The **CHAIRMAN**. Thank you very much. I would like to ask another 30 minutes of questions. But softball season is now over with.

Senator Murkowski?

Senator **MURKOWSKI**. Thank you, Mr. Chairman.

I want to compliment you and your professional staff on a very distinguished panel of witnesses before us today. And I noted your comment on S. 735; I know how strongly you feel about revenue sharing.

You know our concern about it, because it represents a departure from what has been customarily coming to the State of Alaska.

But the potential opportunities to the State under your proposal certainly are an alternative that Alaskans are looking at.

I might also mention that I believe there has been communicated to my colleague, Senator Stevens, the word that the panel is going to present him with a reproduction of the Mona Lisa, so I anticipate that he will be down here very shortly.

We have heard strong support already, as a committee, on the issue of authorizing oil and gas exploration on the coastal plain of ANWR. We have heard, as you know, gentlemen, from the Interior Department, who drafted the 1002 report.

And we have also heard from the people to be affected by any contemplated Congressional action in the coastal plain, and that is the native residents of the North Slope and other Alaskans.

You are also aware of the action in the House of Representatives, where I believe there are about 150 cosponsors currently of H.R. 1078, which is the House legislation to open ANWR for exploration.

I think it fair to point out, gentlemen, that when you look for oil, you usually do not find it. And generally, in this discussion that we have on ANWR, there is an assumption that there are great reserves of oil there.

In Alaska as you know—you are all very familiar with it—if you are lucky enough to find oil, you better find a lot, because the economics as we have seen in Prudhoe Bay and the curtailment of some of the marginal fields associated with Prudhoe Bay, the economics are very important.

I think in hearing your collective points of view, obviously, we have a different viewpoint. You generally oppose the oil and gas leasing in the area, which is certainly no understatement.

But I would urge my colleagues to pay particular attention to your testimony in the sense that we determine the exact reason for that opposition.

When we relate the significance of Prudhoe Bay to the national energy security of this country, a reality strikes us in the reference that approximately 20 percent of our domestic crude oil comes from Prudhoe Bay.

And I need not remind you of the position that was taken back in the 1970s by your various groups, and the realization, Mr. Chairman, that it was a tie vote in the United States Senate, and the Vice President had to break the tie.

From the standpoint of what this would mean to our country today if we did not have Prudhoe Bay, it is evident that we would have to import 20 percent more oil, or have found it some place else; and I think you would generally agree that that is a fair statement.

Another thing I want to point out to you is that I happen to consider myself a conservationist; an Alaskan conservationist. I think a vast majority of Alaskans are conservationists.

We believe in the wise use of our natural resources. But I think it is important to point out a distinction. We are not preservationists. And I think the testimony heard today and the particular point of view, the contribution that your organizations collectively and individually make, it is important to point out that we have a basic difference of premise.

And I think it also appropriate to point out that indeed we have a substantial difference in what is a reasonable analysis of wilderness; what is a reasonable analysis of the internal designation of land in Alaska.

We are talking about huge acreages. And you know this better than I do, because some of you have spent personally more time in the North Slope than I have. You have camped up there days on end. You are going fishing up there. You can appreciate the tremendous land mass.

But the importance of putting it in perspective, I think, bears examination at this time.

As you are aware, there are 375 million acres in the State of Alaska. Under the Statehood Act, the State received 27 percent of that land, or 104 million acres. The native corporations, our resident indigenous population, received 44 million acres; that is about 11 percent.

The remainder, 227 million acres, equates to 60 percent of the land mass of Alaska. And that is in the hands of the Federal Government.

I think it important to take that further and consider the designation by Congress in its wisdom of that 227 million acres; 77 million acres, or 21 percent, are managed by the Bureau of Land Management. 53,227,000 acres, or 14 percent, are in wildlife refuges. 48,325,000, or 12 percent, are in national parks or monuments. 23 million, or 6 percent, are in national forests.

Total designated wilderness is 56,276,899 acres, or 15 percent. Now, Alaskans are proud of that wilderness. We value that wilderness.

But let me give you some comparison of what that wilderness equates to. Fifty six million acres in Alaska is larger than the State of Idaho; larger than the State of Kansas; larger than the State of Minnesota; just a bit smaller than the State of Oregon; a bit smaller than the State of Wyoming; bigger than the State of Utah.

If the acreage in Alaska that is in wilderness were put into the order of states, it would be the 11th largest state. So you can't say that we have avoided, or neglected, the opportunity to put vast areas in Alaska in wilderness.

Now to put it down to a further perspective that I think is appropriate, the coastal plain covers 18,900,000 acres. That is what was set aside as designated by Congress. Out of that, in Congressional action, 8 million acres, or 42 percent of that coastal plain that we are talking about, was designated, in perpetuity, a wilderness.

They took out 1½ million acres, or 8.2 percent, which is the question that we have today before us, whether to allow exploration on the million and a half acres, the 8.2 percent of the 42 percent that was designated for wilderness.

Now that leaves about 8 million acres in refuge, which means, basically, no development; no permanent structures.

So if we look at the whole commitment of the 18.9 million acres, we have got a million and a half that we are considering allowing exploration; we have got 8 million designated wilderness; and another 8 million in a refuge.

I think that that is the point to keep in mind as we discuss the merits of the action contemplated before us, because it is very important that we not overlook the commitment to wilderness that we have in Alaska.

I would also point out a couple of observations that I think are appropriate. The information that we have, and I think it has been referred to by some of the witnesses, indicate that two of the last seven years the caribou have calved in Canada.

Apparently this year it appears that they have calved in Canada as well. The explanation for that, Mr. Chairman, is a little difficult. Some people consider the winter as a factor. It appears that the calves drop when they drop, when the gestation period occurs, regardless of where the caribou are.

But it simply points out that for now, apparently the third year out of seven, the calves for the most part, a large majority, appear to have calved in Canada.

I would also point out something that has not been specifically mentioned by the panel, and I think deserves at least a passing observation, is the Prudhoe Bay experience.

We have seen, as a matter of biological examination, that in 1972 there were somewhere in the area of 3,500 to 4,000 caribou in the central herd at Prudhoe Bay.

Now, since that time, we have seen activity, we have seen construction of the road, an 800-mile pipeline, the development of the Prudhoe Bay field.

It is extraordinary that during that time that particular herd has increased to some 13- to 14,000, and one can only assume that that herd has expanded around a scenario of moderate development.

And we can talk about the predators. Certainly we are all aware that there are no guns in the Prudhoe Bay area. The oil companies do not shoot the predators. The reason for the increase is something else.

The Eskimos take some of the central caribou herd. I think it also important, Mr. Chairman, to note that the comparison that was made that some of the things that are policy in Alaska, are applicable to Alaska, are also applicable in New York and Los Angeles.

Well, that is true. But there are some things that are extraordinarily unique about Alaska. You do not have an ice road in Los Angeles or New York that thaws in the summertime and is gone, leaving nothing.

You do not have an ice island off Long Beach. So where you have mitigating factors associated with the fragile tundra, the permafrost, you also have opportunities to develop unique and extraordinary techncal applications associated with development that you cannot do in Louisiana, that you cannot do any place else, that have virtually little or no impact on the surface environment, if you want to use those.

And I am proud to say that the industry has developed that expertise in Alaska, and used them; and they will begin to use them more and more.

But what we need is a positive attitude that we can do things better in Alaska. And I would challenge anyone on anything more than the general criticisms that have been expressed here today, that the industry and the application of trying to do a better job of developing oil and gas exploration.

Alaska, the Prudhoe Bay area, is second to none; second to none in the expenditure. Second to none in the concern over the environmental consequences, the environmental impact, and I think the rest of the industry could learn a lot from the techniques used in Alaska.

Mr. Chairman, 15 years ago most of these organizations that are here today were opposed to the oil and gas leasing on the Prudhoe Bay area. They were opposed to the construction of the trans-Alaska pipeline. They predicted gloom and doom, the loss of the caribou. The caribou would not pass over the road. The pipeline would be a permanent fence that the caribou would not move over.

And I think the panel is well aware of the reality today, that the caribou do move under it; they move through the passes that were made for the caribou. But mostly, the pipeline has not stood as a hindrance, as evidenced by the increase in the herd.

And I think the appropriate thing to keep in mind, gentlemen, is that the predictions made 15 years ago have not proven accurate.

I think the experience with the pipeline at Prudhoe Bay has demonstrated that the organizations that are before us today were wrong then.

I think for the most part, while I appreciate the constructive efforts of the panel, the predictions about the impending disaster at ANWR are unrealistic.

I think we should keep our experience at Prudhoe Bay in mind, the track record we have established, in evaluating this testimony that we have had today.

Mr. Chairman, I am going to proceed with questions, but I think in fairness to my colleagues, since I went a little longer in my opening statement than perhaps they would, I would defer to them and then go back to my specific questions.

The **Chairman**. Thank you very much, Senator Murkowski.

Next would be Senator Ford.

Senator **Ford**. Thank you, Mr. Chairman. I will try not to make a speech, and get down to some things I am interested in.

One, I come from a consuming state, basicaslly, for oil and natural gas. We do have a little coal. But I notice in here that this panel is generally against coal.

So I have a real problem reading the statements.

The **Chairman**. The committee is also against mining coal in ANWR.

Senator **Ford**. Well, that would suit me. That is at least one good point there.

We will move off that one.

Mr. Harris said in his statement it is time for reason. Mr. Evans said in his statement that once an impartial judgment is made, impartial scientific evidence demonstrates that, and he gave a couple of points.

Well, if it is for them, it has been impartial; if it is against them, it has not been, I have found here.

I am somewhat perplexed at where we are going. I was here when Senator Nelson got the cafe standards. I remember the fight on cafe standards; remember it very well.

I remember when we had the embargo, and I believe Mr. Evans said we are importing about the same amount of oil today as we did then.

I am not sure about the barrels, but it was 32 percent import in 1973; today it is over 40 percent, and the projection is it will be at 50 percent import.

Part of it is price. We do not have any rigs. Even in your statements here, I read where how many rigs are idle in various areas. So you are using that; we do not need to drill.

Well, we need to drill for national security, I think. And as far as methanol is concerned, we will be using natural gas to do that, and that may be a tremendous energy source to be able to allow the use of oil as it relates to the defense of this country, and as you say, maybe a tradeoff on SPRO.

Now, let me ask Mr. Evans, how do we get impartial scientific judgment? I guess you want the professor to answer this?

Mr. **Evans**. I think we do not get it from an administration that has signalled its intentions for the last six years, and puts up an impact statement like this one we have had where they have changed things around to suit the political times.

Senator **Ford**. Well, I could not agree with you more on all of the administration, so you go ahead.

Mr. **Evans**. We do believe that you could get it from an impartial scientific body, and that is what we meant. The National Academy of Sciences for example, some scientists who have no stake in this, who are not going to make any money from consulting reports later on, or something like that, could give us the evidence.

Since we do not have that now, we have to look at what we do have. And as you well know, Senator, more than I, the reams and reams of material that we have evaluated, and our scientist Dr. Beyea has, and with your permission, maybe he would like to respond, too.

Senator FORD. Be glad to hear it.

Dr. BEYEA. First of all, I would like to say that in the statement we talked about our concern about coal, particularly as it relates to use of methanol. And that was our concern.

Senator FORD. Well, you know, we tried in Kentucky, and we tried to use our best. And we have now even eliminated the two-acre permit. We keep trying very hard to do some of these things, and I guess we all get in trouble.

And most of the pictures made about surface mining in Kentucky are those prior to the law in 1970, and not pictures of those since the law in 1970.

So I understand the position on coal. I have been living under that now for about 20 years. So whatever you say, it is not going to be favorable toward coal.

Senator FORD. I understand that and I accept it. As a lawyer would say, and I am not one, we accept that and you do not have to mention it anymore.

Dr. BEYEA. All right. I will move on. I would like to say that the Arctic system is probably one of the least understood ecosystems in the United States.

The Gulf coast is a well-studied system. In reviewing the evidence, we find a great lack of scientific knowledge to reach an impartial judgment, and you can see this in a way because of such a wide variety of statements.

When there is a lot of uncertainty, scientific uncertainty, you see a lot of free-wheeling statements on both sides. So it seems to me the fact that there is such disagreement is in fact evidence that we need more scientific research before we proceed in making a decision about ANWR.

Senator FORD. Something bothers me about that a little bit that there has not been enough study made. I thought we have had an ongoing study since the Alaskan Lands Bill. Geological surveys, all of this has been going on.

I thought there had been a lot of studies and a lot of scientific data developed.

Dr. BEYEA. We disagree. We think that the Arctic system, the ecosystem, that low-energy system is not well understood scientifically.

In other words if you talk to biologists and ecologists about how well they understand a system, how well are they able to predict over 20, 30 years. They come back and tell us, they do not understand that system well enough to make predictions, the same kind of predictions they can make in the Gulf coast.

Senator FORD. Well, you are grouping a lot of people when, they do not know. Now, is that all of biologists or?

Dr. BEYEA. These are biologists that we consult with who do not work for us or for industry. We are perfectly willing to let an impartial group——

Senator FORD. Well, I know, but you are saying all of them do not understand?

Dr. BEYEA. No. The scientists that we have talked to and asked those questions.

Senator **Ford**. So, is that a large number? Is that one or two? What number of scientists have you talked to that do not understand it?

Dr. **Beyea**. Well, I would say of the three or four biologists and ecologists who deal with that system, they all told us that this system is poorly understood.

Senator **Ford**. Okay, so the three or four you have talked to do not understand it?

Mr. **Mahoney**. Senator Ford?

Senator **Ford**. I am trying to get to a point, you are all-inclusive in your statement.

Dr. **Beyea**. You are implying that we have talked to a small sample. Well, we would like to put that to the test, and ask an impartial group, have a study for instance by the National Academy of Sciences to consult the biologists and ecologists in the United States and get a representative view on that.

Senator **Ford**. That was the same request I heard when we had the Alaskan land deals too.

Mr. **Mahoney**. Senator Ford, I would only point out that it was the Department of Interior itself and its draft report that it put out in November that stated that it could not predict with certainty what would be the impacts on various species of wildlife, because there had not been enough analysis at Prudhoe Bay, and because the differences in the ecosystems between Prudhoe Bay and the Arctic Refuge were so great.

Now those statements were taken out of the final impact statement, which we think was just a political move. But that was based on the review that Congress requested and it was based on at least the best scientific literature available to the department.

And it said it could not say with certainty, but then it went through species after species after species, talking about the range of possibilities, and it mentioned for instance 20 to 40 percent decline in the caribou herd, which is up to 72,000 animals lost, or half or more of the wolverines, or 250,000 snow geese.

It went on and on and on, although it stated that it could not say with certainty because we do not have the studies.

Senator **Ford**. Well, you said they took all this out for political reasons?

Mr. **Mahoney**. Yes.

Senator **Ford**. Explain that to me.

Mr. **Mahoney**. Well, we received, I do not have it here with me, but we can supply it for the record, one of those things that government bureaucrats sometimes do, a letter from inside the Fish and Wildlife Service that was a transcript essentially of the regional director's meeting in Fairbanks or Anchorage in February, where it said that Assistant Secretary Horn and Fish and Wildlife Service officials went to Ottawa to discuss the proposal to develop the area with the Canadian government.

And because the caribou spend part of their life in Canada and they are important to the Canadian natives, the Canadian government was opposed to the development and has protected their portion of the Coastal Plain.

The minutes then went on to say that Secretary Horn was, that it was embarrassing to those from the United States side to have the Canadian government cite their own figures, pointing out up to a 40 percent decline in the caribou herd, and then the director of the Fish and Wildlife Service went on to say to the people that worked in Alaska that they would revise that.

Because they did not really know what it was and therefore maybe they should not say that there were any impacts, and lo and behold in the final impact statement there was no new scientific evidence done, there was no time to do any further studies, and there was no real new scientific evidence cited, but the impacts went away.

Senator FORD. Let me see if my statement is correct then. The political reasons you are talking about is agency politics.

Mr. MAHONEY. Department politics.

Senator FORD. Departmental, within the agency politics. It was not any of us up here.

Mr. MAHONEY. Oh, that is right.

Senator FORD. I just wanted to be sure that you would not accuse the administration of playing politics.

Now, Mr. Hair, you said a few moments ago about transferring land illegally, I believe. Did you not say that? Some illegal transfers?

Dr. HAIR. What I said has been going on for the last several months.

Senator FORD. Some illegal transfer of land.

Dr. HAIR. No, no. The secret negotiations——

Senator FORD. Secret negotiations. All right.

Dr. HAIR. That is correct.

Senator FORD. All right. Let me then ask you several questions, if I may. If it is secret, that means you do not want anybody to know about it. A lot of secret things have been going on around this town for some time now. And I want to try and get that out on the table and get it open if I can.

Does the Interior secretary have authority to consummate Alaska land exchanges without obtaining Congressional approval for them?

Dr. HAIR. As it relates to the subsurface rights of the Arctic National Wildlife Refuge Coastal Plain, I believe they do not.

Senator FORD. They do not have the authority.

Dr. HAIR. That is correct.

Senator FORD. Under what conditions would they have the authority to have the secret meetings to transfer land?

Dr. HAIR. Under the presumption if Congress had given them that authority in prior statutes.

Senator FORD. Some people advise them, and that is that impartial advice, that they do have the authority to go ahead and do it. We do not believe they do have.

Dr. HAIR. We do not believe they do either.

Senator FORD. Can you visualize any circumstances under which the Interior might consummate the Alaska land exchanges, even without Congressional approval?

Dr. HAIR. None that I do not think would stand the test of a legal challenge.

The CHAIRMAN. Would the Senator yield at that point?

Senator FORD. Yes.

The CHAIRMAN. When Secretary Hodel was here the other day he reiterated his promise not to consummate any of those land exchanges.

And I think all of the Members of the Committee, including me especially, urged him not to go forward with any negotiations, that they were counter-productive, that it was the wrong thing to do and I think he will discontinue those conversations. I hope he will.

Senator FORD. Mr. Chairman, I think the Secretary said, and I do not want to disagree with you, because I support you as best I can. I thought the Secretary said he would notify us——

Senator BUMPERS. If the Senator would yield, I raised that with the Secretary, and as I recall he said that they had actually made this initial transfer without Congressional approval under some regulation.

But that no further transfers of any kind or exchanges of any kind would be made without Congressional approval.

Senator FORD. Okay.

The CHAIRMAN. And we also urged that they suspend any negotiations. I do not think he made a commitment on that.

Senator FORD. But he never said he needed Congressional approval, however.

Senator MCCLURE. Would the Senator yield on that?

The CHAIRMAN. Senator McClure.

Senator MCCLURE. I am not aware that there were any initial transfers. Senator Bumpers has said that after the initial transfers the Secretary would not do any more. I do not recall that there have been any.

The CHAIRMAN. Well, it is Senator Ford's time.

Senator FORD. I am going to stop now because I have opened up the can, and have other places to go and be and be reported at a Committee meeting.

But I just think that there are a lot of things going on here. You know, it is an easy vote, down in Kentucky, to vote an environmental vote up in Alaska and it does not affect us very much.

But I want to be very careful of what I do down there, a vote from there does not affect my future. And we talked about the Persian Gulf today and protection of those ships. We only have about 6 percent of that oil that we use.

But the rest of the world has a shortage. Then we go to International Energy Agency and then they allocate oil and we are the big loser. So there are a lot of complications out there that you have to think through before you make a decision on one thing and what the rippling effect will be. Thank you, Mr. Chairman.

Dr. HAIR. Senator Ford, before you leave, could I just clarify one point. The thing that concerns those of us who try to work in the public interest the most about this, is the attitude of the administration personified in this case by Don Hodel.

It is an attitude that somehow you take the public's resources and you negotiate in the dark of night to trade away the public's interest. Our society does not operate that way.

Senator FORD. I hope not.

Dr. HAIR. But that is the way that they have been dealing with this issue for the last several years. That is why their recommendation to Congress is so fundamentally flawed.

They have denied what good science has been developed over the last several years, and we have spent lots of money. Those who ought to be the angriest right now with Don Hodel should not be environmentalists, they should be the industry.

Because Don Hodel's report has presented this society the perfect reason not to trust him and not to trust his stewardship responsibility, and therefore Congress not to make a decision. No decisions made, the Arctic National Wildlife Refuge Coastal Plain stays closed.

Who is the loser in that scenario? It is not our interest. It is the interest of the petroleum industry. And it is because of attitude and it is because of political ideology. It is as simple as that. And that, in my view, does not represent the values of this society.

Senator FORD. You just said there is a lot of scientific evidence in the studies over the last several years. Did you not just say that?

Dr. HAIR. There is a significant amount of knowledge. There is a significantly incomplete database.

Senator FORD. But there is a lot of——

Dr. HAIR. Certainly there is some science. There is not nearly enough, sir.

The CHAIRMAN. Thank you, Senator Ford.

Senator BUMPERS. I am not trying to interrupt whoever the next questioner is, just to clarify a point.

Under the Alaskan Lands Bill there was a provision that authorized Interior to negotiate an exchange in the Gates of the Arctic, surface rights in the Gates of the Arctic, for subsurface rights up in the Kaktovik area.

Senator MCCLURE. 14310.

Senator BUMPERS. That is right. And they were entitled to do that. And this is the point that we developed with Secretary Hodel the other day, he pointed out that they did that.

When I said the initial exchange, that is what I was talking about. But they were authorized by law to do that under the Alaskan Lands Bill. But he made it very clear, and I am quite sure the record will show that he said they did not have any additional authority, and would not try to exercise any additional authority to exchange anything without Congressional approval.

Senator MURKOWSKI. That is correct, and I appreciate you making that statement.

The CHAIRMAN. We do not want to get too far off on this because this is Senator McClure's time. And the time is wasting.

Let me recognize Senator McClure. If he wants to yield he may.

Senator MURKOWSKI. If I may make a comment on behalf of Senator McClure. I think it unfair to characterize Secretary Hodel's integrity with regard to the issue of land trades, without fully explaining the benefit to the public interest.

And I intend to get into those questions in my next time around. I think that is important to point out.

Dr. HAIR. I think the question should be brought before this panel.

Senator MCCLURE. I am sorry this last exchange occurred before I had an opportunity to make my comments. I was fully committed to recognizing the contributions that each of your organizations makes to the public discussion, realizing that you have a particular point of view, but recognizing your integrity and your honesty in presenting those cases.

However, Dr. Hair, the statement you just made about Secretary Hodel's integrity requires me to respond in kind. Your organization is not above scare tactics. Your organization and your own personal statements are not above misrepresentation of facts as you know them to be.

Your organization and you personally are not above distorting scientific information in order to get your own point of view across. I think if you want to have a respectful hearing for people who really want to know what the facts are, you should confine yourself to facts, and you should state them honestly and clearly.

Now, I cannot help but note that certainly everyone at this table is dedicated to the positions which you have taken. And I respect that. You are good advocates for your point of view, and I respect that.

We in the Congress of the United States must sort out what you have told us along with what everyone else has told us, and create some kind of a balance in public policy that serves the national interest. And we try to do that.

But if I differ from you, I do not want to have you question my honesty. If I come up with a different conclusion, I do not want you saying that somehow we have dealt in secret or under the table.

With respect to secret negotiations, these have been going on for some years. We have a letter from Secretary Horn dated March 31, giving us a great deal of information with respect to these proposals.

So it is not as though they have some kind of a secret plan for negotiations that somehow, if you can drag it out as a smoking gun that you can then say they are dishonest public servants. I do not think that helps us one bit, as we try to determine what kind of policies we ought to have.

I can not help but note that when you look at the rewards that might come from development on the North Slope in terms of total gas and oil that might be discovered on the North Slope or in ANWR, you use the lowest possible prediction.

And, when you talk about potential damage you use the highest possible prediction. You cannot have it both ways, but I am sophisticated enough to be able to read that.

I also have been around long enough to know that it is not unusual for people on either side to state their case in the strongest possible terms. I do not call you dishonest for having done that.

I just would indicate that certainly we need to look at the ranges of potential. Let us not start talking about the damage that might occur if there is total development with the widest possible production.

And at the same time say that the potential for benefit is at the lowest possible level at production. It is one or the other. It is not both.

Now, having said that, I am somewhat apologetic because I understand that you feel strongly about your points of view. And you are entitled to. You ought to say so, and you do. I do not condemn you for that any more than I condemn others for promoting their particular point of view in the strongest possible terms.

Unfortunately, it falls upon us, as it does upon other policymakers, to try to sort out of all of that rhetoric what appropriate policy ought to be.

I know too that, yes, indeed, your organizations, every one of them, were opposed to Prudhoe Bay development. Every one of your organizations was opposed to the Alaska pipeline project.

And you stated so. You stated it in terms that have proven not to be true. And you continue to say that we do not know enough, nor ever will, to satisfy everyone that we are knowledgeable about a fragile ecosystem such as the vast areas on the North Slope.

But I do know some things, and I think you know them too. You are opposed to many alternatives.

I wish each one of your organizations would provide for the record the number of protests that you have filed for oil and gas drilling on public lands. Not just on wildlife refuges, but on all public lands.

I think the record indicates that you are active in opposition to oil and gas drilling in most areas of the country on public lands. We have to try to determine out of that what we ought to do.

I heard a suggestion a moment ago that methanol was the answer. Most of you are opposed to the gas drilling from which methanol is produced. Most of your organizations are opposed to strip mining for coal, from which many of the alternative fuels will come.

It is all right. I think you have a right to be opposed. But do not come up here and tell us that the alternative is more coal mining, when you oppose more coal mining.

You are in favor of conservation. And I commend you for that because conservation has proven to be a greater economic and environmental asset than we had thought it to be.

I will confess that under the prodding of organizations such as yours we have made headway on conservation that we would not have otherwise made. And you were right in part, and I was wrong in part, in regard to what conservation could mean to our country in economic and environmental concerns. And I commend you for having been right where I was wrong, at the margins on those discussions.

Mr. Chairman, I am concerned, as I know you are concerned, about the vulnerability of this country to the dependence upon imported oil. I think you feel that way, collectively.

You want to find an alternative. You want to find a different alternative than we are discussing here. We need your advice and your input. And we need to have it in as objective a terms as you are capable of presenting it to us so that we can listen to you with the kind of respect your organizations ought to enjoy before the Congress of the United States.

And most of you have that kind of respect. I hope you will continue to have that kind of respect up here as we discuss very, very difficult public policy issues in which balance is really the question.

We need a balance between different objectives and different values. And I can not help but note the one statement that you made, Mr. Hair, that this is really a question of values. Because certainly there are different values.

But I am convinced that the vulnerability of the free world to the availability of oil supplies distorts foreign policy, imperils national security, affects economic well-being of our countries, and that too is a value worth being concerned about. Thank you very much, Mr. Chairman.

Senator DOMENICI. Would you yield?

Senator McCLURE. Yes.

Senator DOMENICI. I regret that I have to go. I wanted to stay for the rest of the hearing. Dr. Hair, I want to say, had Senator McClure not said we said, I would not have said it as eloquently, so I am glad he did.

I think your characterization of the Secretary is inappropriate. As a matter of fact, I think he is doing his dead level best in very, very difficult circumstances. I have found him to be the exact opposite of your characterization.

Perhaps he does not agree with you. But I really have found him, as compared with many others in three administrations, to be a man that has a lot of integrity. And he is trying very hard to do what is right.

Having said that, I want to add one dimension to the Prudhoe Bay situation versus this one as discussed by Senator McClure and Senator Murkowski.

Frankly, I believe the votes were close in the Prudhoe Bay and Alaskan pipeline situation for the precise reason implied by Senator Ford. I think it was easy to cast an environmental vote because it was way off in Alaska.

I submit to you that the American people understand that this is an American problem now. I do not think the votes are going to be cast on the basis of, let us chalk this one up to a good record, because after all it is way over in Alaska.

Enough American people understand that oil is fungible. As a matter of fact a great quantity of Americans are delighted that the English found oil in the North Sea. They understand that discovery helps us, because we are less dependent upon the cartel.

So I frankly believe we have a much broader dimension in terms of balancing here than we did in the 50-49 or 50-50 tie vote in the Prudhoe Bay situation, because our people understand that Alaska is a state. They understand that if there are resources there that can be used by the American people, that we ought to use them.

That indeed it is part of the American potential for becoming less dependent and doing what we can during a great transition period, because someday we might not have to use any of these resources.

But for the time being our very, very existence depends upon it. So I regret that I had to echo his comments. But I just wanted to add the dimension that I really believe that Americans understand the issue.

This is not an issue of let us do something for you all and the group you represent, because it is way over there in Alaska. I think the American people really understand, that it is all of us, whether we are in Kentucky or Ohio or Illinois or New York, that is involved in this decision. Thank you, Mr. Chairman.

Dr. HAIR. Before Senator Domenici leaves I think it is incumbent that I get a chance to respond to both his and Senator McClure's comments.

The CHAIRMAN. Yes.

Dr. HAIR. First off, I would not imply that Don Hodel is personally dishonest. But I am implying, and I think the record speaks well for itself, that his stewardship of the Department of Interior's conservation programs during his tenure is significantly wanting.

I think that if you look just a few weeks ago at his commentary on how we deal with the international ozone issue, and to suggest that perhaps Americans should be encouraged to wear sunglasses and sunscreen as a responsible course of action in protecting the public interest, I do not see how you reach that conclusion, Senator.

We have done a careful analysis——

Senator DOMENICI. Well, I will tell you, he came up here and explained that to this Committee, and I truly believe his response here. You may not, but I do.

Dr. HAIR. Fine.

Senator DOMENICI. I believe it was taken out of context. That is not his solution to the ozone crisis, nor was he addressing it in the context that you are addressing it at this moment as his solution to the ozone crisis.

Dr. HAIR. I would be happy to present you with the analysis that we have done of Don Hodel's conservation initiatives during his tenure as Secretary of the Interior. And without failure, where there is a decision to be made in the broad public interest, it always erred on the side of exploitation, not on the side of conservation for future generations.

The CHAIRMAN. Thank you, Senator Domenici.

Senator NELSON. Mr. Chairman, may I say a word about that. I have been involved for 40 years in conservation issues.

And as a conservationist, I think that it is fair to say that the two people, Secretaries that we have had, who have been the least sensitive to the concept of conservation in that 40 years were Secretary Watt and Secretary Hodel.

They are entitled to their viewpoints. But their viewpoint is exploit every single thing in sight. The money comes first and the preservation of the integrity of the environment comes last.

And that can be demonstrated in dozens of dozens of ways. So I support what Jay Hair said about that.

The CHAIRMAN. Before we get off too much on the question, let me just say that in terms of integrity I did not take the comments here as being an assault on Secretary Hodel's integrity.

If it was I think you have indicated that you did not mean that, Mr. Hair. And I certainly am one who am a strong supporter of Secretary Hodel's integrity. I believe him. I think he is sometimes wrong, and that is what we are here today to decide on. His judgment and not integrity.

Let us stipulate that Secretary Hodel is a man of very high integrity and let us talk about what his judgment and our judgment ought to be about the Arctic National Wildlife Reserve.

And with that we will recognize Senator Evans.

Senator EVANS. Thank you, Mr. Chairman. Bashing seems to be a public sport of recent years, and I would hate to extend the Hair-bashing that has gone on.

But I cannot let the statement go. It does not have anything to do with Mr. Hodel. He is perfectly capable of handling his own integrity and himself in any argument with any or all of you. I disagree with him on many occasions as it relates to some of the issues which are in front of us.

But Mr. Hair, I found it most repulsive for you to be so arrogant as to say your organization represents the public interest. You represent some interests. You represent the interests of some people.

That is a long way from representing the public interest, and I think for anyone to grab hold of that term and say that they and they only represent the public interest, is arrogance of extraordinary proportions.

I suspect that Mr. Hodel, whether you believe that he is wrong all of the time or a portion of the time, believes in his own heart he too is representing the public interest. I suspect everyone sitting around this table, with the wide variety of viewpoints we have, believe we are representing the public interest.

But to suggest that somehow any of us solely and only represent the public interest and those who disagree with us represent a much lower and venal interest, is arrogance of ultimate proportions.

Environmentalists do not have 100 percent batting record. Nobody does. You are wrong sometimes. We are wrong sometimes.

But I think that with the exception of my distinguished colleague, the former Governor of Wisconsin and Senator, as far as the rest of the panel is concerned, I think I was working on environmental issues while you were all in knee pants. This is a reflection of age more than anything else.

Let me just carry on what Senator McClure said to some degree. I believe Brock Evans suggested that as the price of gasoline increases, the marketplace will gradually bring into use more efficient vehicles and some combination of alternative transportation fuels, such as methanol, ethanol, electricity, liquified natural gas, and possibly hydrogen.

Well, with the exception of the last, and that is mostly because we have not heard yet how we are going to economically produce hydrogen, the Senator from Idaho has already talked about the opposition to the many ways in which to produce methanol.

Certainly there has been strong opposition from all of your organizations on the advancement in production of electricity through either nuclear or coal plants, and the addition of almost any new hydroelectric energy.

Liquified natural gas requires the same kind of drilling and perhaps in some of the same sensitive areas that are the subject of today's hearing. I do believe that we have a significant energy problem.

I am a strong believer and felt from the very beginning in the Pacific Northwest Power Council that we could achieve most of our new electrical needs in the Northwest through conservation. And we have proven to be right in that effort.

Conservation can not do all of the task, however, whether it is for electricity or transportation energy or anything else. As plants wear out, as needs increase, it has got to be the ultimate in conservation and efficiency, but it has also got to be new resources.

Frankly, I have told the administration on numerous occasions when they have been before this Committee that I do not think they have adequately reached out in terms of energy research and development. They have focused too heavily on two or three fields, like coal and nuclear, and have let the others go.

Frankly, I think the direction that we are now heading, and the fact that most people in this country have lost interest in energy issues, means that we will probably need sometime in the relatively near future to apply ourselves in the same fashion we have now finally tried to apply ourselves in combatting AIDS.

We will have the energy equivalent of an AIDS epidemic unless we are careful, and I think unfortunately we are headed in that direction. With all of that, let me just say that I have a pretty fundamental view in terms of wilderness and its use.

When we are in doubt, I think we ought to preserve it. Wilderness destroyed cannot be regained. Wilderness preserved still contains the resources and the opportunities that can be used at some future time if we desperately need to do so.

But frankly I do not think that in some of the comments, and in some of the testimony, that you have advanced that case very well.

Dr. **Hair**. Senator Evans, before you leave let me very briefly respond to your initial comments.

I agree with you. If my intent had been to imply that environmentalists are somehow the sole representers of the public interest, that would be the height of arrogance. Clearly we are not.

Clearly there are many publics and there are many ways of representing those publics. Clearly you are a distinguished public servant.

My point is this. That those of us who are trying to reach a responsible decision on this or a national energy policy are not doing it for any personal gain. You look at the other side of the equation. Who is going to benefit financially from this kind of activity?

It is not environmental groups. It is those groups that are pouring hundreds of thousands of dollars into this effort. What I am trying to articulate is that those of us who do not work for those kinds of financial gains, but who work broadly speaking in the public interest, are trying to bring a more reasoned sense of dialogue to this debate.

Senator **Evans**. Well I certainly think that, and as I said at the beginning, I do not disagree with the Secretary and all of his policies. And certainly he is not doing it for personal gain.

He certainly, in terms of personal gain, could do a lot better to get out of the hot seat he is now in and take any one of scores of private jobs he might undertake.

Sure, there is a benefit. There is a benefit to you and to everyone in this room, to all of us, if the profits flow to those who in the companies producing energy-related materials. We are the consumers.

And the question is how much we are going to pay and how available those materials are going to be. There is not one at this table, I would be willing to bet, who did not arrive here from your home without using petroleum products.

We are all users. And to suggest that somehow it is just the companies who are the gainers or who make the profits out of it, there are profits in more than just dollars.

Dr. **Hair**. I agree. But the point is, what we are trying to advance is the notion that, should we not at this juncture be getting all of the facts on top of the table?

Should we not really understand what has happened from an environmental impact point of view for the last 10 years on North Slope development? Should we not understand what is going to happen to that caribou population up there of 180,000 animals of world-class stature?

Should we not understand why fish are not even mentioned in the Interior's report? Should we not understand what is going to happen to the 500 musk oxen that are there 365 days a year, and they are not at Prudhoe Bay?

Should not those things be a part of the public dialogue?

Senator **Evans**. Sure. And if you would confine yourself to that, you would make your case. When you add the free comments that caused the eruption on this side of the table, I do not think you have advanced your case.

Dr. **Hair**. Point well taken. We advance that in this report to Congress, and I believe strongly, as a scientist, that facts are friendly.

We are preparing another report to submit to Congress on the environmental impacts of North Slope developments. Those are the best available facts. But we simply can not advance a decision of this national consequence by the kind of report that the public received from the Department of the Interior and have it represent any sense of confidence that there is a due diligence being exercised, and that responsible stewardship is being foreseen.

Senator **Evans**. That is what these hearings are all about.

Dr. **Hair**. Yes, sir.

Senator **Evans**. We are trying to get those facts from a wide variety of sources and we will avidly read all of them.

Mr. **Evans**. Could I jump in to respond? Energy conservation is certainly one of your strong points of expertise, Senator.

I just wanted to speak to it a little bit because a lot of that is in our testimony, and I think you cited a little bit.

We were attempting to show here that there are in fact other alternatives, that they are on line, in fact the Japanese are already doing them. On the point of natural gas and methanol, that was an illustration of something that is already there.

I would like to say for the record, though, since it has come up several times, that the record I think will show that we do not oppose all new oil wells, new gas wells, new strip mines, anything like that.

To us, in our minds, and certainly mine personally, it is very site-specific. Yes, there are lots of sites. And that is what the chart is there to show where the places are that in our opinion are not so controversial or are not controversial at all. I think it is very important to say that.

Finally, because I may not get another chance on this, I would like to say that I was Chairman of the first Alaska Coalition in 1973 on the oil pipeline matter, Senator Murkowski.

And the issue was not opposition to Prudhoe Bay and the development there. It was not opposition to an Alaska pipeline. It was opposition to that particular routing for the fear that there would be a massive oil spill.

And I am from Senator Evans' state, as he knows, and we were concerned about that in Puget Sound a lot. Now, that has not come true yet. That is quite right. The tankers go every day, and let us hope it does not come true.

But I wanted to say that for the record. We supported a route down the Alcan Highway going that way, so it could be used for domestic resources only and not for export too. But that was the issue because I was there at the time.

The 49-49 vote that everybody talks about with Spiro Agnew breaking the tie was not against the whole thing, it was on a NEPA exemption, the National Environmental Policy Act.

This was one of the very first NEPA exemptions Congress ever voted on, so it was very controversial indeed. But I just wanted to say that because I was there. We are not opposed to all these things.

We think these are site-specific, they are case-specific. That is the basis on which we come to you. There is only one place like this too, and that is the case we will try to make better if we have not made it yet today. And there are indeed alternatives to do it that exist now and we already have done.

The CHAIRMAN. We need about a four or five minute recess and not longer than that. I will see you back here in four minutes.

[Recess]

The CHAIRMAN. The hearing will come back to order, please. And now the least among us shall be last, Senator Bumpers.

Senator BUMPERS. That is what I call an Archie Bunker malprop.

First of all, I will just start with Mr. Evans. Would it be permissible in your opinion, and if so under what conditions, to ever drill this area? Ever.

Mr. EVANS. Ever, ever, ever?

Senator BUMPERS. Ever, ever, ever.

Mr. EVANS. I guess the answer, speaking as an American, like everybody else, yes. Eventually. Last, but not first. Or near the last.

There are other places obviously we also care very much about. When other places are explored, when we have explored other options, and I am not talking about pie-in-the-sky kinds of options either.

I am talking about reasonable things that are being done right now, that are being explored. Some of my testimony points out that energy technology advances are going at an incredibly fast rate from conversation.

So, yes, at that time, in the case of a national emergency, with ones coming down the road, I realize you can not put these things on line right away. But I think we can exhaust many other opportunities before we even have to face that. But my answer is finally, sure.

Senator **Bumpers**. Can you conceive of any precautions that environmentally should be taken at such time as we actually do drill it? Can you conceive of any that are not planned to be taken under existing conditions?

Mr. **Evans**. Yes, I guess. My experience in the Arctic, working with those who built the pipeline and all the rest of it, the infrastructure there, made me realize how difficult it is to do real Arctic engineering then or now, how little we know.

We are learning more all the time, I agree with that. I think the particular grave questions up there are the availability of fresh water, what to do with the salt water for desalinization plants, that sort of thing. Those are really hard to answer. Or the gravel too, in that area.

Having seen the human things about how it works, Senator, up there with the oil companies and all the money and all the power there day and night, pressuring the biologists. They have a job to do.

They have got to get that product out and get it going. And you get the feeling that the biologists who are speaking up for the other side of things do not get the same kind of support.

So the monitoring is something we all say we are going to do. But actually there on the ground, it does not happen. For example, I read recently there was an over-wintering fish site in the Prudhoe Bay area, deep fresh water there, that was forbidden to be drained, was drained anyhow by someone else, and you can not get those things back when they are done.

I do not want to ramble here, but I think there are a number of things, and I have named a few and I could name more.

Senator **Bumpers**. Mr. Hair, they tell me that there has been 1,300 miles of seismographic work done up there. Have you been there?

Dr. **Hair**. Oh, yes. Sure. Several times.

Senator **Bumpers**. Have you been there since that seismographic work was done?

Dr. **Hair**. Yes, I have.

Senator **Bumpers**. Do you detect any damage done as a result of that?

Dr. **Hair**. The damage that you see, Senator Bumpers, is if you are flying over from the air, it is kind of like a gridwork from where the seismographic lines went across it.

From an environmental point of view, it would not be considered a significant environmental impact. It would recover over a period of several years, perhaps a few decades.

But the seismographic activity——

Senator **Bumpers**. Mostly just vehicle tracks, that kind of thing?

Dr. **Hair**. That is correct, where the seismographic vehicles went across the tundra. And it is a gridwork pattern. You can fly over it, it is very prominent.

Senator **Bumpers**. Have you been to the Chevron well that has been built in the, what do you call it, the 1003 lands? Is that right? Kaktovik area?

Dr. **Hair**. Yes. I have been to the site where the Chevron well and the Kaktovik-Inupiat Corporation was drilled. All that was left there were the timbers used for the drilling pad. The drilling had already taken place, and they had left the area.

Senator BUMPERS. What happened to their waste pond that they always build when they drill?

Dr. HAIR. I do not think they built one in this particular case. I do not recall seeing one.

Senator BUMPERS. If they built one, it had been covered up somehow? Or disposed of?

Dr. HAIR. It was not apparent to me when we went by it.

Senator BUMPERS. Did you detect any eternal and everlasting environmental damage there at that site, other than just the tree that normally accompanies a well like that?

Dr. HAIR. No. But it is important to point out the difference in an exploratory well and a full field production well system.

Senator BUMPERS. I understand that.

Dr. HAIR. Okay.

Senator BUMPERS. I understand the distinction you are making. But I am just talking about, did you see any residual damage there, around there?

Dr. HAIR. No. None on the tundra that would be considered permanent ecological damage. No, sir.

Senator BUMPERS. When it comes to the caribou, and I am one who as a country lawyer and layman back in the 1960s was sort of misguided because I thought the environmental community was being overly obstreperous in getting the pipeline built.

After I came to the Congress I developed a much keener appreciation for your concerns, and applaud you for having delayed that, even though the cost was substantial. I think we would probably have had oil all over the Alaskan landscape, if the environmentalists had not insisted that that line be built differently from the original plan.

But as you know, I am usually on your side of these issues. I believe, as the English philosopher said, nothing more utterly possible than to undo that which has already been done.

So I want to approach this, I am one who has not made a decision on how I am going to vote. And I certainly want to approach it as carefully as I can. But it seems to me that what Congress is being asked to do here is to weigh what obviously will be some adverse environmental damage, and maybe everlasting damage. I do not know.

We have to weigh that against what we get out of it. Now I am one who am inclined to postpone the drilling. But if I were not going to be able to prevail in this Committee and in the Congress on postponing that, how would you feel about the middle course of drilling two or three exploratory wells?

I mean, Senator Nelson pointed out, I believe it was Senator Nelson, pointed out in his testimony, and quite frankly I have heard Senators on this Committee say that if we could just drill that Beaufort Sea area there just east of Prudhoe Bay, there is enough oil and gas there to keep this country going for the next 25 or 30 years.

And we have drilled and drilled and drilled in there and found nothing. The leases do not even find an offer, they do not get any offers on it. So this is a role of the dice as to whether there really is oil there.

I would like to know what Chevron found. They found something. If Chevron had not found something they would not have shut it in. You do not shut in a dry well. You plug it.

But I do not know whether any of us are ever going to know. I think maybe there are a few people who know and they are not telling. How would you feel about, under the severest environmental constraints, building, let us say drilling, give the industry the right to pick the areas, the choicest areas, and drill, say, three exploratory wells?

You might not have to drill three. You might just have to drill one. You might hit a gusher, and you know then that——

Dr. **Hair**. You have asked the all-important question. How do we proceed from this point forward.

Do we legislatively designate it as wilderness and lock it up forever? Do we do nothing and have it managed as a de facto wilderness area as part of the Wildlife Refuge system? Or will Congress authorize some next step?

A next step being represented by the legislation which would call for full field leasing and development, or something other than that. In a perfect world, what one should be doing now is trying to understand nationwide those hydrocarbon deposits which we as a Nation control.

Having an idea what is in our storehouse. I think it is in the Nation's best interests to understand more about the hydrocarbon deposits on the North Slope of Alaska, particularly in the 1002 area.

But I by the same token think that as this debate and dialogue continues, there are other values that are just as important, both in the near and long term, that have to be considered.

Could I, could we, the National Wildlife Federation, support an exploratory drilling program? Yes and no. No, if it is the kind of program that the industry wants, to go and lease and then have the options for full field development, regardless of how carefully stipulated.

Yes, and this is an important point. Yes, in the sense that our commission that we are calling for addresses one of those areas of national security.

That if Congress were to stipulate that any exploratory drilling that occurred would be required on structure drilling, not off structure, on structure, so that we actually have a better indication of what the hydrocarbon resources are there, and then a step, a mandated step where it comes back to Congress for another round of public discussion about whether or not those reserves are of sufficient value right now that we go in and take them out.

Or, are they of sufficient value that we know what is there, we leave them in place till the year 2050 or whatever, at which time we would have a more articulated position of a national energy policy, I hope.

We would have a better fix on what technology could be. But what can not happen right now is we can not allow uncontrolled exploration and off structure drilling. We need to know.

We have retained our own petroleum geologist. There are some interesting structures there. But we need to know what is there. But we do not need to have an automatic decision.

Senator BUMPERS. How would you feel about Congress giving the Alaskan, the native corporation there the right to drill additional wells on their land?

They were given permission, as I understand it, to drill this one well which Chevron drilled. What if we authorized them to drill others?

Dr. HAIR. No. It is the Coastal Plain. It is only the 1002 by an artifact, because that is the section of the law that designates it as such.

The KIC lands, right in the heart of the Coastal Plain, are a part of that ecosystem.

Senator MURKOWSKI. Would the Senator yield?

Senator BUMPERS. Yes.

Senator MURKOWSKI. The Arctic Slope Regional Corporation is authorized to drill three wells. They have only drilled one.

Senator BUMPERS. Were they authorized to drill three?

Senator MURKOWSKI. That is correct. There is not much of an incentive if you do not have any assurance that you are going to be able to move the oil if you find it.

Senator BUMPERS. Do you have any idea how much, Senator, how much Chevron spent on the well they did drill?

Dr. HAIR. I do. It was $50 million.

Senator BUMPERS. $50 million?

Mr. MAHONEY. Senator Bumpers, I think that we have engaged in a very similar process in the National Petroleum Reserve. I am not sure we would agree that the outline, the scenario that you outlined, would actually occur.

We had a Naval Petroleum Reserve. It was transferred to the Department of Interior in the 1970s. And it was authorized for government exploration as a reserve. We were going to keep that oil there for military purposes.

Senator BUMPERS. Are talking about the Elk Hill Naval Petroleum Reserve?

Mr. MAHONEY. I am talking about the one in northwest Alaska, 20-some-odd-million acres of land. That is where the geologists originally thought the better chances of finding an economically viable oilfield were.

But they really were not very satisfied with the oil exploration program. The wits were saying that if they had been industry wells, they would have found something. But they were government wells. They did not know how to do it.

And nothing really satisfied the political debate. We had to open the area and open the area and open the area until in 1980 we authorized full leasing.

And only under full leasing, an expeditious leasing program, where the oil companies started getting their own private rights, did ultimately the issue get satisfied in that the oil companies themselves satisfied themselves that there was nothing there. Or they do not think there is anything there.

If you chose three arbitrary wells in the Arctic Coastal Plain, Arctic Refuge Coastal Plain, I believe that your odds are that the oil companies would come back and say, we found something.

Now we definitely have to open it up. The geology is certain. We really know there is a lot of stuff here, and the significance of the natural values cannot compete with it.

Or they would say we have not found anything yet. But we really have not had a very fair chance. And the debate would continue, only there would have been a little more development and a little more development.

And more environmental damage. I do not think you will ever satisfy this interest until they really feel that they have had the opportunity to invest with chances for development.

Senator NELSON. Senator Bumpers, may I respond to the question raised a little bit ago.

You raised the question, whether there were any circumstances under which one might endorse drilling there. Well, of course you can conjure up out of one's imagination all kinds of horrendous circumstances——

Senator BUMPERS. National emergencies.

Senator NELSON. My view is it ought to be designated a wilderness. But Congress can always, out of its wisdom, 10, 20, 30, 50 years from now, decide whether it is in the national interest to do so.

But this question keeps turning around on the ground we must do it. We must get this stuff out. There is a national security question. Well, it is interesting to me, and this is Hodel's argument, this was Watt's argument, Secretary Watt said it time after time.

Now, last month you had before you here, Assistant Secretary William Martin, and during the course of his testimony he said that energy conservation has proven to be the most expeditious way to reduce the need for new or imported energy resources.

And in fact, it now contributes more to balancing our national energy ledger than does any other single fuel source.

Yet, when he testified before this Committee last month and was asked the question what the administration's ideas were on conservation and renewable energy, he stated the administration has "no specific proposals to help these sectors at this time."

Now if they are up here telling us that there is a national security question, but they have no long term alternative energy plan, no long term conservation plan, that they take the mileage achievement fleet average, stop it at 26, and if they left it in place during the lifetime of a $3 billion well up there it would save 3 billion barrels of oil.

If the Congress would increase the mileage achievement to 30 miles, it would save 8 billion barrels of oil during the same period, and at 40 miles it would save 21 billion barrels. And half way in between at 35 it would be somewhere around 16 billion barrels. We are talking big figures here.

Now, the question is a question of values. I do not think we ought to touch that, unless you are prepared to say that no really significant park of nature's work on the face of the earth ought to be preserved.

That we ought to develop every single thing, every single place we can find. I thought Clinton Anderson's eloquent statement ought to answer that for all time. The answer to that is no.

Are we going to end up seeking to find every gallon of water and use of every barrel of oil? Now, take the lower 48. One, we have 2.2 billion acres of land under the jurisdiction of the United States, 375 million acres in Alaska. About 1.8 billion acres in the lower 48.

We have 1.8 billion acres. There is not a single complete ecosystem in the lower 48. Why? Because every time the issue came to a confrontation in this country between a developer of something, cutting timber, mining, oil, any exploitation you can think of, the argument always went, oh, the economy demands it.

What is the consequence? Our careless development and pollution of the resources of America have been tremendously expensive. It has cost us trillions of dollars more than we made from the exchange.

You tell me when it is all done where we are going to be at in this country because of our careless pollution of the underground water supplies of America? Or our careless permission of the draining of the aquifers, the Ogallala?

Or the fact that we are draining tens of thousands of acres of wetlands every year on the argument, I am a developer, I will build an office building here. Drain the wetlands.

Pretty soon there will be no wetlands left. That is the holding pond for the underground water supply. It is for the migratory birds of the country. So every time we have went, we have chipped and chipped and chipped, and the argument is the same.

It will be good for the economy, it will be good for national defense. Pretty damn soon you do not have an ecosystem left in the lower 48. The closest conceivable thing you can even talk about would be the Yellowstone ecosystem.

You have got to take the national forests that surround it, 6 million acres. And that is part of an ecosystem. It is not complete like this one up there. Now is it not of value to humanity that we preserve in its complete form a complete ecosystem, unaltered, untouched by human hands?

If it is not, the hell with it. But the fact of the matter is I think it is very valuable. And I think it would be a terrible shame for Congress to go ahead for 3 billion barrels, or 6 billion, 3 billion is the predicted average, 3.2 billion, which after all their computations which come about, based upon weighing a bunch of imponderables.

They come out with about 3.2 billion. Make it 6 billion. So what is 6 billion barrels? Six is 4 percent of the total consumption spread over 25 years. Four percent of our daily consumption.

We can make it all up just by doing one thing. Make those cars require a higher achievement standard. Is that some sacrifice that the country can not stand, that you have to have a bit lighter car?

We have got 40 mile cars, 45 mile cars on the roads. They are good cars. They save a lot. Here we are talking about just for the exploitation of a predicted 3 billion, if, if in fact, you found some oil at all, and that is a 19 percent chance, they estimate.

And we are going to destroy the last ecosystem of its kind on the face of the earth, on the face of the earth. And then to stand around here hollering that it is the national security.

The national security is being damaged by the failure of this administration, and the failure of Congress, to come up with a long term conservation and alternative energy plan. You have Secretary Hodel saying the national security is at stake, and you have got the DOE up here saying, we have no alternative plan and no conservation plan.

What in the hell is that? That is nonsense.

Senator BUMPERS. I have no further questions, Mr. Chairman.

The CHAIRMAN. Just a couple of questions here. I think you very eloquently made the case about wilderness and about the value of a wilderness, a separate ecosystem, solitude and those things.

Now if we may get beyond that argument, I do not ask you to surrender that argument. But I want to go to the next step and ask you to talk about the special values, wildlife, fish, air, water. What is different about ANWR?

Because there will be some subsequent witnesses, as I am sure you can appreciate, that will say there are caribou elsewhere, the fish are not important, the air is like air everywhere.

This is your opportunity to talk about the special values there. Who would like to talk about that?

Mr. ROGERS. Well, the special qualities of the Arctic Refuge, and you have got to go there, you have got to stand on the Coastal Plain. You can not take a quick fly. You can not take a quick trip over there, followed by an industry tour at Prudhoe to understand it.

You have got to be there. It is a place where you can stand, you know that this is how this earth has operated for millions of years. That there is natural processes occurring there.

It is an example for all of mankind to step back and say, this is where we come from. This is the roots of where humanity and all of the life on this earth has come from. It is obvious when you stand out there. When you see the mist roll in off the icecap off the Arctic Ocean.

That is the concept in itself. But getting into more details. This is the only place where we do have a free-roaming caribou herd which can be protected in its entire range.

Granted, there are other caribou herds. We have got the Western Arctic Caribou Herd. Right now there are in fact more animals in that herd. But what are the odds of that herd's range staying intact for future generations? They are slim to none.

The CHAIRMAN. Let me interrupt you at that point and ask what in your view is the worst that can happen? Let us say we had exploration, big discoveries, full development. What is the worst that could happen to this caribou herd?

Mr. ROGERS. I think that the caribou herd will survive up there. I think that it is possible, through the data, it is speculative as to whether the decrease in numbers of it is going to be 40 percent, 80 percent, or 10 percent.

There will be some effects. But there will be caribou out there. They may not migrate and go to the same area of the Coastal Plain to calve. How much difference?

I mean, I gave you the statistics from Fish and Wildlife Service biologists. The death rate of calves when they do not calve in the 1002 area is almost twice the rate of what it is when they do calve there.

How much that is going to affect the population, and how much elimination of the predators from the ecosystem will help compensate for that, to me that is not an acceptable tradeoff.

We have eliminated predators in the lower 48 states. There is a large constituency of these "conservationists" in Alaska who would like to turn the entire state into a moose farm. There are active area wolf programs. This is not acceptable over the entire state.

The CHAIRMAN. All right. Tell me about the musk ox. And I know we do not know enough about a lot of these things. I think all of you have made that point over and over again. We do not know enough about it.

What happens to the musk ox? What are the dangers to the musk ox?

Mr. ROGERS. Well, there is very little knowledge about what exactly happens with musk ox under intensive development. So it is speculative. And that is an area of weakness in the data.

They do know from the seismic exploration program that there was a major displacement of musk oxen whenever any activity occurred. For perhaps 2 miles around any movement of the seismic lines.

Now, when you take the scenario of full-scale oil and gas leasing proposed by the Department of Interior and pipelines, roads, drill pads scattered throughout there with the major gravel sources coming from the river flood plains, which are the essential habitat for the musk ox, to me that equates to a potential to eliminate that herd from the Arctic Refuge.

Okay, well, take a step back in history. Let us say, big deal. The musk ox were eliminated out of there once already. Maybe we do not need musk ox out there, and there are some that would take that claim.

I can not tell you conclusively, nor could the Fish and Wildlife Service, exactly how many animals will be left there under a full-scale oil development.

The CHAIRMAN. But the danger to the musk ox is a maximum of complete elimination and really an unknown, is what you are saying.

Mr. ROGERS. Yes. Basically, in the final report, they think that maybe the population will stay stable. It has been expanding.

I personally would not accept that interpretation of the data. I think that it is going to decline. It may or may not eliminate the herd.

The CHAIRMAN. All right. Brown bear.

Mr. ROGERS. Brown bear. First of all, the Coastal Plain itself does not have a very high population of brown bear.

The primary time when brown bear come out onto the Coastal Plain is they come out of the mountains during the calving season. They are a major predator of the caribou calves at that time of the year.

I think it is safe to say that in any areas where there will be intensive development, where there will be production facilities, there will be the elimination of brown bears. They will be killed.

In the construction of the pipeline they continually got into the construction camps, the garbage, going so far as to come right into the cafeterias at certain times. Literally.

They are not afraid of man. They come until the point gets where men are afraid of them, they got shot out. That will occur in any areas where they have conflicts with man, just as it has occurred all over the United States and in many areas of Alaska.

The CHAIRMAN. All right. How about the polar bear? I think you have spoken to that. Or somebody did. Or maybe it is a report that showed that we do not know where their dens would be.

Mr. ROGERS. Right now the Department of Interior's report says that the polar bear birth rate is approximately equal to the death rate in this area of Arctic Alaska and Canada, the whole ecosystem in general.

They say that the two major port facilities that are proposed in the 1002 Report lie square in the middle of the onshore polar bear denning sites.

During the seismic exploration program, with the full knowledge of the location of a polar bear den, because it was a radio-collared bear, and the direct instruction to the people working on the seismic exploration to avoid that den site, the crews got too close to it, the bear was forced out of her den. The speculation was that she aborted her cubs.

The very likely scenario is that once this development takes place, and keeping in mind that the 1002 area is the only part of the coast of Alaska where they really have good documentation of onshore polar bear denning sites, that this would be, along with the other cumulative effects which are not adequately addressed, this will be what pushes the polar bear death rate over its birth rate.

The CHAIRMAN. How about bird life? There are a lot of geese and ducks in that area. Are there not?

Mr. ROGERS. Well, yes. The primary species that has been addressed in the 1002 Report is the snow geese. The 1002 coastal area provides the staging habitat for over 50 percent of the Pacific flyaway population.

At some times there are over 300,000 snow geese that stage there before they migrate down to the wintering areas, which are in other areas of the United States. Now, we do not have good data, again.

This goes back to the questions. There has been a lot of data brought out by the Department of Interior, but you can not understand an ecosystem and all the ins and outs in five years of the most exhaustive studies possible.

Data just now being completed is indicating that the snow geese, it is essential to them to have this preferred staging habitat where they can feed, build up fat reserves, so that they can complete their migration southward.

Speculation again, if they do not get to their preferred habitat, if they do not have the prime nutrients that they need for that migration, maybe they will not go quite as far.

If they do not go quite as far, maybe they will not have as high a survival rate from their wintering areas. Now, that is looking at snow geese as one of the indicator species.

There are many other species of bird life up there, which are barely even looked at at all.

The CHAIRMAN. Your principal point here is that there is not a database to tell on snow geese or other bird life what the effect would be? Is that fair?

Mr. ROGERS. I do not understand your question.

The CHAIRMAN. I am saying, your point is that there is not a database to tell the true effect on snow geese or other bird life. You really do not have an adequate prediction for what might happen.

Mr. ROGERS. That is correct. But we do know that the main staging area is right square where there will be the port facilities, and major activities. They will be displaced from that habitat.

The CHAIRMAN. All right. Now, what is the danger to the fish life? We touched on that earlier.

Mr. ROGERS. I did want to get a chance, especially in discussing the fishing, because I was just on the Conga Cut River, which is in fact outside of the 1002 area, because I went further to the east because the caribou had not come in that far this last week.

We had wanted to fish in the Conga Cut River. The fish were absent from it because the wintering sites do not exist close to the area where we were. As has been pointed out, very few fish overwintering sites, places where rivers do not freeze solid through the winter.

If those areas are tapped for water, it will be devastating to the fish populations of all of those areas.

The CHAIRMAN. If those areas are tapped for water, you say?

Mr. ROGERS. If they are tapped for water. And they are the only sources that are known for water available up there at all. There has been some scenarios proposed such as putting up snow fences to collect snow and then melt down into water.

This is where you get into a direct problem with the exploration also. Because the exploration wells consume vast quantities of water and you do not have any of these other facilities.

Going back to the 1002 Report, when they talk about well water desalinization plants, that is what we can put on the coast. Well, that is a long ways from where some of these wells might end up getting drilled, and they do not look at the impacts of what those desalinization plants will have either.

The CHAIRMAN. All right. One final question. I touched on this earlier, but I am still unclear in my mind. That is with respect to air quality.

Why is it worse put a ton of a given pollutant, NOx, SO2, or whatever, into the air in ANWR than in the Gulf coast or in some other place?

Mr. ROGERS. I will say a few comments and then Dr. Hair might have a little bit more elaboration.

The CHAIRMAN. And I am not recommending that we put more pollutants into the air on the Gulf coast. We have got plenty already, thank you.

Mr. ROGERS. With regard to air pollution, it is a very prime example of what we do not know a lot about.

They have just initiated regular ambient air quality monitoring at Prudhoe Bay. Despite the fact that the Department of Interior has had over five years to complete this report, they looked at the Central Arctic Caribou Herd and Prudhoe Bay, and because it increased in size, it supports their cause.

They did not look at the pollution problems. They could have instituted air quality monitoring in cooperation with EPA, so that it can find out what is really coming out of there, and then take their best scientific extrapolation possible to project what that might mean to the Refuge.

The CHAIRMAN. Is there enough of a database to say that air pollution in the Arctic is worse than air pollution elsewhere? And if so, why?

Mr. ROGERS. I do not believe that we do. I am not necessarily qualified to speak on the overall big picture of this.

I think that there is major concern for air pollution in the Arctic. And it is different. In Denver, you expect air pollution. You have got a lot of traffic. When you start talking about 2 percent of the total U.S. emissions of nitrous oxide coming up from Prudhoe Bay, where there is essentially no other activity around, you have got an incredibly large emission taking place there.

Now you have got to take some fairly detailed studies to see where that is going, if it is transferring itself, becoming acid rain——

The CHAIRMAN. I understand that question about what we do not know. But my question is what we do know. Dr. Hair, can you speak to that?

Dr. HAIR. Yes. Let me just very specifically, Senator, say that it is not governed by the laws that you create here or the laws and policies that I would like to see implemented.

It is governed by the laws of thermodynamics. Very simply, warm air expands and is transported easier as you would find off the coast of Louisiana, then does cold, denser air. It stays closer to the ground.

We know that a number of the airborne pollutants that are coming out of the North Slope of Alaska are toxic. They kill plants. We know that because of the short growing season up there on the tundra, those plants do not generate anywhere near what you would find in a bayou in Louisiana.

It is a very, very different kind of ecosystem. The most important thing is we really do not know what has been the level of air emissions over the 10 plus years of development, or their impact.

Only one year of monitoring, 1979, has been conducted until just recently. And out of that one year a variety of models were generated. Now EPA, the State of Alaska Department of Environmental Conservation all agree that those models underestimate somewhere by a factor of 2 to 5 the NOx emissions. Sulfur dioxides are not an important consideration on the North Slope because of the kind of fuel that is burned.

The CHAIRMAN. Let me say, I am not trying to make your case rise or fall on any one of these things. I am simply trying to understand.

If there is a specific danger to one of these things that is peculiar, and I understand the lack of a database, and as you say in your report, that is a very big reason here.

Mr. MAHONEY. Mr. Chairman, there are sort of two thoughts I have. One is that, if you look at this as a web and you pull one strand and then you pull another strand, and then you pull another strand, the question is, do you still have the web or at what point does the web collapse?

All of the scientific data on the wildlife that the Department has done is the speculation on the impacts of this species and that species and the next species. I think our people are concerned that pretty soon the interactions, the development affects different species different ways.

And then the species themselves interact with each other in this ecosystem. And there is danger of collapse of the functioning ecosystem as it has existed.

The CHAIRMAN. Through the air?

Mr. MAHONEY. No, I am just talking about the effects on individual animals.

The CHAIRMAN. Right.

Mr. MAHONEY. But I am also suggesting that the scientific data, it is pretty imprecise to study the north of Alaska in laboratory conditions.

But the scientific data is usually done by studying change in a system you are tinkering with, such as Prudhoe Bay, with a system that is called a control. It is operating naturally, and to measure the differences between the two in those ways.

Such as the dynamics of populations between caribou and wolves are occurring that have been referred to at Prudhoe Bay, where there are no wolves anymore and the caribou herd is up.

Well, in this simple line of the ecosystem, wolves are down and caribou are up in the Arctic as well. We know it is not the oil development, we can not understand all of that. But there has been rabies outbreaks——

The CHAIRMAN. If I may get back to the air, I want to do these things one at a time, if I may, because I can not juggle a lot of facts in my mind at once.

I am trying to think of the worst that can happen in each of these scenarios. What I am really trying to get at is, what is your theory about what is the worst, because it can only be a theory since we do not know enough.

For example, on the greenhouse effect, if it exists, and we think it does, then at a certain rate the polar ice cap may melt and Louisiana may be inundated and the climate may change and all of those things.

We do not know that that is going to happen. So what happens if we put these pollutants in the air at ANWR?

Dr. BEYEA. May I make a comment on this? There is a big debate now going on over the impacts of air pollution on the lower 48, and there is a significant body of scientists who believe that air pollution is leading to damage of our lower 48 forests.

There is also a significant number of scientific opinion that disagrees with that. I would say it is split about 50-50. So we see that regardless of whether the pollution is better or worse, those of us in the environmental community are concerned about significant, long term damage over a period of 20, 30 years on existing ecosystems that we know about.

Then we look at Alaska, where we also know that the system is much more fragile, and in biological terms it is a low-energy system, and we are suspicious that if air pollution may very well be doing this significant damage to our forests in the lower 48, what can we expect up there? So therefore, we get very nervous.

The CHAIRMAN. Well, it is perfectly obvious that we do not know all the answers to these questions. Now, Senator Murkowski is coming back.

Senator NELSON. Let me comment on that for one point, Senator.

The CHAIRMAN. Yes.

Senator NELSON. You have a wetlands area, a place without much rainfall, lots of permafrost. And it is wetland and a very short drawing period.

You have, I think it is 108 species of birds that come in, and it is the staging area for many other birds and feeding. If you have an air pollution deposition going on to that fragile landscape, there is a very compelling reason to believe that you are going to damage the food chain upon which these hundreds of thousands of birds feed.

So my guess is, without being a scientist, we all ought to be worried about what that impact might be. You could destroy the whole food chain.

Dr. HAIR. Senator, you have seen the letter from EPA recently to Secretary Horn on a wide range of environmental problems up there.

As I understand it, Administrator Thomas is going personally to the North Slope of Alaska in July to see that situation for himself.

The CHAIRMAN. Very good. Gentlemen, I want to again thank the panel before I turn it over to Senator Murkowski. It has been really an excellent panel. I have learned a lot today.

I must go to lunch. Thank you, Senator Murkowski, for your patience.

Senator MURKOWSKI [presiding]. Thank you, Mr. Chairman. As you know this is a very important matter and I appreciate your consideration.

I think in fairness to our concern over the wildlife on the Coastal Plain, recognizing that a good deal of this wildlife does migrate with the seasons in search of sustenance, that there have been substantial contributions that have been made in the sense of management.

For example, we are all aware that under the Marine Mammal Act, non-natives may not take polar bear. That is a significant contribution to the welfare of the polar bear, needless to say.

The native people do take a modest amount for subsistence. I think it is important to point out that scientists, biologists generally agree that there is more activity with the brown or grizzly bear on the slope than previous informal history seems to indicate.

Most of this comes from the observation of the native people, who traditionally use a portion of the area for their subsistence lifestyle.

They have made these observations. Of course, it is fair to point out I think that there have been stipulations made in association with the Prudhoe Bay development, where they do not allow hunting in the area; the State of Alaska does not allow hunting.

There are no guns that the oil workers take out and go shoot a caribou. Obviously this has had an effect on that habitat. And I think that it is important to point that out to the American people.

There is a concentrated effort, a concentrated concern to maintain that resource and the value of that resource. The same thing is generally true of the musk ox. Indications are the musk ox herd is on the increase.

I would agree with you, there is a lot left to be determined, but it is like, gentlemen, whether you are suggesting the glass is half empty or it is half full. And your representing your point of view, but I think it is important that we point out the other side of the wildlife habitat issue.

The bird life, of course, is most significant. But to blame declines in snow geese and other things on Alaskans or Alaska's native people is really a bit unfair, because we know that those are migratory birds, they move all over.

You know as well as I do that you can go down to Mexico and pay $50 or $100 and go shoot migratory birds, unfortunately, that we are trying to protect. And Alaska Ducks Unlimited has done an extraordinary job of adding to the wetlands.

So it is not all black. There are positive contributions being made, and I think that it is appropriate that the record reflect the concern that Alaskans have, the concern that the native people in Alaska have expressed in their willingness to voluntarily reduce their subsistence hunting of species that are reduced.

Not because of the use of the native people in Alaska, but because those birds, those geese, have been taken in other areas and obviously we would all like to have better control of the management of that.

You have spoken eloquently of the ecosystem, and I would agree that it is an extraordinary ecosystem. But it is also a 56 million acre wilderness, 15 percent of the State of Alaska's land mass.

And we are talking about allowing exploration on 1.5 million acres. That is 8.2 percent of the designated Coastal Plain. Now we are talking about keeping in perpetuity as wilderness, a substantial portion, 8 million acres.

We have got 9.4 million acres that we are talking about putting in a refuge. Now, ideally you will never have enough ecosystem, and I would not suggest to ask you what is reasonable, what is enough?

Mr. MAHONEY. Senator Murkowski, may I go over some of the numbers on the acreage, because I think we are in some misunderstanding here.

It is our understanding that the Arctic Wildlife Refuge itself is 19 million acres, of which about——

Senator MURKOWSKI. Eighteen-nine, is the figure I mentioned.

Mr. MAHONEY. Yes, about which 9 million acres are in the wilderness system. But those acres, the great majority of which are in the Brooks range, not on the Coastal Plain. There is only a very,

very tiny area of less than 40 miles of the Coastal Plain itself that is in the wilderness system.

The 1.5 million acres that we are debating in the 1002 area is all on the Coastal Plain. And then also on the Coastal Plain is the 7 million acres of state land, which is where Prudhoe is.

Then there is the 20 some odd million acres of the National Petroleum Reserve.

Senator **Murkowski**. The Naval Petroleum Reserve.

Mr. **Mahoney**. So, in talking about the numbers, most of the wilderness that we are happy is protected, and the wildlife refuge that we are happy is protected, is not on the Coastal Plain itself, whereas most of the Coastal Plain itself is in development status or multiple use status.

We are just dealing with a very small portion, a hundred miles out of 1,100 miles.

Senator **Murkowski**. Well, I would differ to suggest that most of the Coastal Plain is under development because obviously it is not.

Mr. **Mahoney**. Well, it is public policy that would be the——

Senator **Murkowski**. I think if you look back at the record you would find expert testimony indicating that if all of the 1.5 million acres were put up for lease, and there was development on all 1.5 million acres, under a scenario that has been presented for the record, there would be a little over 12,500 acres utilized.

So I just want to keep this discussion in perspective, the magnitude of the area and whether portions of it are in the Brooks range, the fact is there is a habitat protected.

And I think it is fair to ask, and I guess this would be an appropriate question at this time, what would you anticipate would follow the depletion of oil and gas reserves in the 1002 area of ANWR, the 1.5 million acres; would there be a population center there in your anticipation?

Would there be something that would replace that activity after it was exhausted?

Mr. **Rogers**. Well, of course, Senator Murkowski, anything along those lines would be speculation.

Senator **Murkowski**. That is what we are doing today.

Mr. **Rogers**. And if the area ever does get opened up to oil and gas development, then the Congress could delineate the future of it beyond that.

But as the experience has been with the trans-Alaska pipeline, you do see more and more development spreading up that way. And I really think that a lot of the concerns of the conservationists that were expressed at the pipeline hearings are still valid, and that many of those will be proven to be true.

With specific developments, I mean, you are seeing a major push by the State of Alaska right now to acquire major acreage along the utility corridor pipeline all through there for specific development purposes.

You have got a new village developing at Coldfoot. Some of this may take place over the Arctic Wildlife Refuge, if it is ever developed. You have got right now a major push going for public access, and there are pros and cons to this issue, along the Dalton Highway, all the way up to Prudhoe Bay.

Now one of the reasons that the pipeline itself has not had a major impact on the caribou herd is that the pipeline really does not split the migration corridor of a major herd. The Central Arctic Herd is basically located over to the west.

Senator MURKOWSKI. Does the Dalton Highway substantially detract from the migratory movement of the Porcupine Herd? Yet, they cross that Dalton Highway.

Mr. ROGERS. You are referring to the Dempster Highway in Canada?

Senator MURKOWSKI. Excuse me. You are correct.

Mr. ROGERS. Yes, they do cross it. And it is a much different time of the year and they are not in major aggregations at that time.

So some caribou crossing the Dumpster Highway in Canada cannot be correlated to what might happen with major post-calving aggregations crossing highways and pipelines in the 1002 area.

But one thing with regard to impacts that are occurring and could occur in the 1002 area is, you have no doubt seen front page coverage in the Fairbanks Daily News Minor about a year ago about the major problems with illegal hunting taking place on the North Slope, and illegal use of off-road vehicles.

And it has gotten to the point where the Alaska Department of Fish and Game is concerned about the future of the Central Arctic Caribou Herd. Even if there are not direct facilities built up there, especially with falling budgets up in the State of Alaska, there is very little reason to believe that there can be adequate monitoring and enforcement set up there.

You know, in theory you can control a lot of these things, such as hunting of wolves, et cetera. Maybe the oil company people do not have guns up there. Their subcontractors do.

The fact is there are major effects occurring. There are people that trap along the sides of the pipeline roads up there.

Senator MURKOWSKI. Some of those people have been trapping along the area for many, many years.

Mr. ROGERS. These are truckers rather than natives.

Senator MURKOWSKI. I think the facts remain that the Central Herd has increased from 3,200 to 4,000 in 1972 to 13,000 to 14,000 today. That is the good news. We are very pleased at that and we hope that they continue to prosper.

Mr. ROGERS. I agree there.

Senator MURKOWSKI. But to suggest that there is some bogeyman around that is necessarily going to eliminate this, I do not think is realistic either.

Mr. ROGERS. Excuse me. With regard to the Central Arctic Caribou Herd, almost all of the caribou herds have been expanding in population up there, and there is really no good indications why. But if you compare the——

Senator MURKOWSKI. There is a combination of indications why. And you know, man has contributed to the enhancement of that.

Obviously, if the Department of Fish and Game in the State of Alaska wants to open it up for hunting, you are going to see substantial take. And it is going to reduce the number of caribou. They do not allow that.

Those are the points that I think need to be brought out on the other side. Sure, there is a lot we do not know. There is a lot of things we will never know. But the point is, we have had an experience in Prudhoe Bay. It is documented. We can improve on the same applications someplace else.

I am going to move along because I know that you are getting tired of sitting, and I do have several questions. I will try and be more direct in my questions, and I would appreciate your response to the questions in that manner.

There has been some talk about the concept of industry responding to a lease scenario. And of course, unless there is assurance that, if they do find economic reserves of oil, that they can get them out.

Nobody is really interested in going in there on exploration only leases, because it has already been pointed out that the expenditures associated with exploration are really high.

There has also been suggestions that there is "uncontrolled drilling." I think you would agree it is hardly uncontrolled drilling. The rules, stipulations, mandatory applications of procedure, both by the State of Alaska and the Federal government, as far as procedures, are stringent.

There is every reason to think that that control will continue. So I would assume that when you say uncontrolled drilling you do not really mean that in the sense of what uncontrolled means to the average layman.

Mr. MAHONEY. Senator, you have hit the nail on the head. If you are granting a lease you are granting a private right to the land, and if there may be regulations regarding the drilling, to meet certain state or Federal stipulations.

But essentially, the decisions over that land have been turned over to the private corporation, and the corporation does not want that otherwise.

Senator MURKOWSKI. You have stipulations to maintain during that drilling.

Mr. MAHONEY. We are not confident that those stipulations will prevent massive degradation of the environment in this particular place.

Senator MURKOWSKI. In the discussion concerning the ecosystem, the realization that there are three DEW line facilities, two abandoned, one still active.

There is the Village of Kaktovik in existence. That obviously has an effect on the wilderness character of the Coastal Plain; an effect on the ideal ecosystem.

Is that, in your opinion, extraordinarily detrimental? It is there. We know about it. We have got to live with it.

Mr. ROGERS. Yes. That obviously does not enhance the wilderness values of the area. But, at the same time, most of those facilities that do line sites are very limited in their location, activity is limited around them, and in and of themselves they do not sacrifice the entire values of the wilderness character——

Senator MURKOWSKI. Well the point I wanted to make is, as you are very well aware, is that this activity does not imply that this area is without some impact from permanent or semi-permanent activity.

Certainly the Village of Kaktovik is a permanent activity, and the activity associated with those residents that live there is permanent, and will have an effect on an ideal ecosystem as well as the DEW line sites. And that is just a fact of life.

Mr. ROGERS. Yes, I agree with you, Mr. Senator. But keep in mind that what we are looking at here is our desire to see an intact system preserved for long range purposes for future generations.

Senator MURKOWSKI. And you know, if there is no oil of substantive values and reserves, with the exception of the people that live in Kaktovik and the activity associated with due line, that might be all there ever is.

But the question that we have is, we do not know, and we will never know unless we allow exploration.

Dr. BEYEA. But you can have 30 years of exploration. You are going to have exploration every time the price of oil—you are going to have the oil companies come back in again.

Senator MURKOWSKI. Well, I do not know that you have got people standing in line to go into Naval Petroleum Reserve No. 4.

Dr. BEYEA. At this price, at these current price levels.

Senator MURKOWSKI. Well, that is right. And you are seeing——

Dr. BEYEA. But over the next 30 years, you would expect that there will be pressure to go back in there and open it again.

Senator MURKOWSKI. Well, it just depends. I can recall, as you can, gentlemen, the scenario with regard to the Gulf of Alaska.

And there was going to be a tremendous impact on Yakatat. And we were very concerned about what it would do to the lifestyles of the people. There was a lot of excitement on both sides.

We also had a situation in another portion of the Gulf. The impact on Seward. The only difference is, they did not find oil. They spent a lot of money.

That does not mean that exploration is necessarily concluded, but it certainly has dampened the enthusiasm. And the enthusiasm has been dampened, as the record indicates in this hearing, on Naval Petroleum Reserve No. 4.

So oil is where you find it. You never know unless you look for it. And the question is, is it in the national interest in this case to allow exploration?

Mr. MAHONEY. Senator Murkowski, we have made some decisions over vast tens of millions of acres of the North Slope of Alaska and offshore, based on some of the earlier development predictions to make public policy to open these areas up.

Now, maybe there will be oil and maybe there will not be oil. But likewise, maybe the cumulative effects of a lot of more development on the North Slope than what we see today may be much greater than the effects that you can point to over the last 10 years at Prudhoe Bay as well.

Senator MURKOWSKI. Well, I have heard it said that if there is a better place to have found oil and gas where it will have less effect on the environment and the ecology and so forth, it is the Prudhoe Bay area.

Others will argue that point, as you have, where you suggest that it creates an impact on the ecosystem that is an extraordinary one, and I would agree with that.

When we talk about free-roaming caribou herds, and we have talked about it, I believe there are five herds, different sizes, but all free-roaming in nature within their particular geographical migration movement.

How can you justify calling the Porcupine Herd the last free-roaming herd? And, is it not true that the Canadians did a pretty thorough job of exploration in the area which is now a national park?

They evidently were not very satisfied with the geological findings in that area, and then they made a determination that this would be the best area.

Mr. ROGERS. With regard to your first question, Senator Murkowski, all the herds up there are correctly free-roaming. The essential term with regard to the Porcupine Caribou Herd is migratory.

All the herds are not migratory. The Central Arctic Herd is not migratory. So there is a big difference there. None of those herds are located in an area which has a vast trek set aside such as the Arctic Wildlife Refuge, with its wilderness portion and the Brooks range in the southern part of the Refuge, and the Northern Yukon National Park.

The calving grounds, for example, of the Western Arctic Caribou Herd are in the National Petroleum Reserve Alaska potentially opens for leasing.

If we lose the battle over the Arctic Refuge, we have no chance of protecting the calving grounds of the Western Arctic Caribou Herd in the National Petroleum Reserve.

Senator MURKOWSKI. How can you suggest losing the battle when there are over 8 million acres that are going to be in a wilderness?

Mr. ROGERS. Are you referring to the existing 8 million acres that are not located in the Coastal Plain? And we do not have a representative of the Arctic Coastal Plain ecosystem.

We have a very minor portion, which goes from the Conga Cut River to the Canadian border. We do not have a representative of the Arctic Coastal Plain in the national wilderness preservation system.

See, there is a difference in our mind between the Brooks range——

Senator MURKOWSKI. Well, I do not know how you can divorce the fact that the portion in the Brooks range and wilderness does not support the general ecosystem of the Coastal Plain is beyond me, because there is a movement of all kinds there, whether it be the grizzly bear that come out of the hills or whatever.

Mr. ROGERS. Of course it is important. And that is an essential part of what is up there. That is why we have already [illegible] most of the ecosystem protected.

But keep in mind the words of the U.S. Fish and Wildlife Service, the 1002 area is the center of biological activity. It is the most important biological part of that entire range of the Porcupine Caribou Herd. That is their words. Not ours.

Senator MURKOWSKI. Well, the implication that you can not initiate exploration, which has already been indicated before this Committee would occur at a time when there is no migration of the caribou, it would probably occur in the wintertime, lends one to say, well, exploration, there is very little danger of an impact.

The impact would therefore be on production. And the production is a long-lasting commitment, obviously, where the caribou would be exposed to activity.

And as the governor indicated in his position, which was a concern over the area where a majority of the caribou are believed to calve, yet there is great disparity as to the identification of that area. How much it is. And if indeed you did put some structure there, whether it would have an impact.

The esteemed caribou biologist, Dr. Bergerud, states that, you know, his experience is that the caribou basically move away from an activity and are not permanently disturbed.

And he has observed them, lived with them for 22 years. So you have all kinds of educated opinions, depending on what particular point of view you want to take.

Mr. ROGERS. Senator Murkowski, what you have just done, though, is you have isolated this back into a single issue of just caribou versus oil.

Senator MURKOWSKI. I have attempted not to by including the entire 8 million acres, which is part of the system.

Mr. ROGERS. Well, in my testimony previously, or in response to questions, I said that I believe that you can have some caribou left in that area.

You can drill in the winter and protect caribou. What are you going to do about fish over wintering? Where are you going to get the water? What is going to happen to the musk ox during that time?

And then, irrefutably, wilderness characteristics will get damaged. So you can look at this in any set of formulas, depending on how far you want to go.

Senator MURKOWSKI. Well, I think it is quite appropriate that some of those questions be posed to the industry tomorrow, and we will do that.

Mr. ROGERS. We have had several people ask us today what we feel about the possibility of a few exploratory wells in the 1002 area. That is a tough question for us, with the position, because there is the need for data. We will all admit that.

But let us try the flip side of this question, and maybe you will want to ask the oil industry tomorrow what they think, now that they have gone into NPRA, they do not think there is much there. Let us talk about designating the entire range of the Western Arctic Caribou Herd as wilderness to permanently protect that.

We know there is not a lot of oil there. Nobody is getting any out of there. That is the flip side the question.

Senator MURKOWSKI. Are you proposing a trade?

Mr. ROGERS. No, I am not.

Senator MURKOWSKI. Somebody had to ask since you suggested it.

Dr. Hair, did the Wildlife Federation retain a Thomas R. Marshall to provide an independent assessment of the seismic information used in the 1002 report? I would be interested in what his conclusions were because I understand that the Department's geological work generally meets very, very high standards, and that the Department was perhaps conservative in regard to the oil and gas exploration possibilities.

I am curious to know how you reconcile this conclusion with your assertion that the Department's report is misleading and inaccurate and, I think you used the word, flawed, with inaccuracies, flaws, et cetera.

Dr. HAIR. I would be delighted to respond to that. Yes indeed, we did retain Mr. Marshall. In fact, his report is part of the appendix of our official report we submitted to all members of Congress. So there is nothing hidden or unavailable to the public about the report.

Mr. Marshall, as you know, for many years was a state petroleum geologist for Alaska, a very respected and dedicated professional. In his report to us, he indicated there obviously are some significant prospects in the Coastal Plain that are at this very preliminary stage geologically of interest.

He points out that two of those prospects, numbers 18 and 19, basically are in the Kaktovik-Inupiat Corporation area, and it goes out to the territorial lands, are perhaps the most important. He points out that they are large dome structures.

And as he points out and as everyone knows, you do not know what is there until you punch a hole in the ground. He also makes a comment that the fact that there are oil seeps in those areas, one need Angun Point and the other just north of the Village of Kaktovik, suggests there is something below the ground.

He also points out that they may not be from the dome. They may be from stratographic traps and therefore not have quantities that would perhaps be commercially viable. What he also points out is that there probably is an underestimation in some respects of Interior's report.

Our comments about the Interior's report being so fundamentally flawed have to do with all of the other range of issues: the environmental impacts we brought out here again today as it relates to ongoing North Slope activities; the wide range of fish and wildlife things that we have been over many times, and I will not bother to repeat them again; and the fact—and I stand by the fact—that during all this process the Interior Department was secretly negotiating to trade away the public's rights.

Senator MURKOWSKI. That is hardly representative, Mr. Hair, of the portion that you are referring to in your testimony, where you say the report actually indicates only a seven percent chance of finding more than three billion barrels of oil, there is a 93 percent chance of not finding that much oil, and there is only a one percent chance of finding more than nine billion barrels of oil.

"Given these"—which I can only assume are the above inaccuracies, flaws—"Congress should not rely on Interior's report." I assume that you are referring to those estimates. I guess you are not. Is that right?

I do not want to drag this hearing out all day. You either are or you are not referring to those estimates.

Dr. HAIR. I am referring to, the Department of the Interior says that if—well, let me back up—that if we had not drilled in Prudhoe Bay, we would have now today a 9.5 billion barrel supply rather than the 4.5 billion that we currently have.

Our view is that the Interior report——

Senator MURKOWSKI. That is not what you refer to in your testimony. You refer to these figures which I just read.

Dr. HAIR. Yes.

Senator MURKOWSKI. And I am simply asking you whether you think that they are accurate or, as you state in the next sentence, "inaccuracies, flaws," and so forth?

Dr. HAIR. I think the Interior report is——

Senator MURKOWSKI. No, no, just a minute. I am not going to let you off here, because you specifically refer to that portion of the report concerning the reserve or the chances and the odds.

Dr. HAIR. There is a 19 percent chance of finding 4.4 billion barrels. The Department of the Interior says that in the year 2000 that is about a 27 day supply.

Senator MURKOWSKI. I understand that. My point is, given the figures from Mr. Marshall which are representative here in your comments, in your opening statement, your conclusion is that they are inaccurate and flawed.

Dr. HAIR. Those comments are from the Interior report, not Mr. Marshall's report. Mr. Marshall's report is included in its entirety as an appendix to this document. Those numbers are from the Department of the Interior's report, not Mr. Marshall's.

Senator MURKOWSKI. Well, are those numbers flawed?

Dr. HAIR. Are Interior's numbers flawed?

Senator MURKOWSKI. Yes. In your opinion, yes or no?

Dr. HAIR. I think they vastly misrepresent the situation.

Senator MURKOWSKI. One could conclude in your opinion they are flawed. Thank you.

One of your comments earlier was concerning the geophysical activity and the impressions concerning patterns that are across the tundra and so forth. And of course, we are all quite well aware that those do not mark slashings across the tundra, because nothing is slashed. Those mark a track weight that has occurred as a result of traffic over the tundra, and those impressions will last for a period of time as a consequence of that.

But I just wanted to make sure the record reflected that there is no permanent slashing; the effect of an impression is one of great concern to all who are interested in the Arctic, whether it be development or non-development.

And I think you would agree as a result there is more winter activity, as a result of ice roads, that do not necessarily eliminate the fact that you are going to have an impression, but that the utilization of vehicular activity with larger sponge tires, all are attempting to address the unique reality that you do have an after-marking.

Dr. HAIR. What is going to happen when Prudhoe Bay is gone?

Senator MURKOWSKI. It is my understanding when Prudhoe Bay is gone what is there is going to be removed.

Dr. HAIR. Where are the funds going to come from? Are we the public going to be expected to pick that tab up?

Senator MURKOWSKI. I feel quite sure that the State of Alaska, because of its commitment to maintaining an environment that Alaskans feel very strongly about, will make sure that appropriate funds are made available from a combination of sources to take care of that.

Of course, the pipeline has to be removed. You are aware of that?

Dr. HAIR. I am sure you are aware that there has been no research work done on the rehabilitation of the tundra ecosystem.

Senator MURKOWSKI. I do not want to argue the point. There is continued research going on and they are continuing to apply new techniques and will continue to do so.

I would appreciate it if, for the record, you would identify the photographs from your testimony specifically as to where they are and when they are taken. And I would like to start with the first one.

Dr. HAIR. I do not have the dates with me. I can provide the precise locations.

Senator MURKOWSKI. Can you provide that for the record?

How about this picture here of the oil burning?

Dr. HAIR. I will provide those. I did not bring that with me. We have the information.

Senator MURKOWSKI. And this particular dump?

Dr. HAIR. That is the North Slope Borough Oxbow landfill and waste pit near Dead Horse.

Senator MURKOWSKI. I see. Now, for the record, that is not an oil company or State of Alaska dump?

Dr. HAIR. Well, that is a very good point. I am glad you brought it out, because we have not talked about it. It is the basically uncontrolled impact of the support industries up there.

Senator MURKOWSKI. Well now, did you say "uncontrolled"? In fact, obviously this stuff is not all over the tundra. It is in the dump. Now, I am not commenting on the beauty of the dump, but you know, you use the word "uncontrolled."

Well, if it was uncontrolled you would not have a dump. It would be buried in different places around. This is a governmental activity I would assume you are referring to in the sense of the North Slope Borough and the authority that it has, which, among others, is refuse collection.

Dr. HAIR. That is correct. And as I pointed out in my testimony, there has already been a major hazardous waste violation that the State of Alaska pursued through one of these contractors, and finally Arco and Standard put up the money to have the hazardous waste material removed.

Senator MURKOWSKI. Well now, does that not show less than a haphazard approach, when we have the enforcement indicated by the State of Alaska and a willingness by the industry, when there are violations, to act accordingly? I wish the rest of the industry in the United States were as responsive as the industry in the State of Alaska, and I wish the rest of the states were as direct in their commitment to trying to monitor this activity.

Dr. HAIR. Well, it is not quite that way, Senator. I spend a lot of time talking to the Department of Environmental Conservation people. They are vastly understaffed, they are underfunded.

The case of where Arco and Standard came in to clean up the hazardous waste that they were responsible for was simply a clear case of their cutting their losses.

Senator MURKOWSKI. Well, we will provide you with the record of what the State of Alaska expends compared to other states on a proportional basis, population or whatever, on conservation. You will find it the highest in the nation. I am talking about environmental conservation.

Dr. **Hair**. On the North Slope?

Senator **Murkowski**. Environmental conservation.

Dr. **Hair**. Okay.

Senator **Murkowski**. All activities associated with that.

Dr. **Hair**. I would like to look at that on the North Slope.

Senator **Murkowski**. We would like to be able to spend more.

So you do not—you have no idea when this was taken and you cannot identify the——

Dr. **Hair**. Oh, I can very definitely identify when and where. These pictures by and large came from the Alaska Department of Environmental Conservation. They are not pictures made up.

Senator **Murkowski**. But there is no identification on the back of them or anything.

Dr. **Hair**. I did not look for that purpose.

Senator **Murkowski**. It would be very helpful to the Committee to have that information.

Dr. **Hair**. Sure, I would be glad to submit that information.

[The information referred to was not received.]

Senator **Murkowski**. Obviously, this shows oil drums being burned. We do not know where it is.

Dr. **Hair**. But we know the pictures are not made up, do we not? We know we did not dream them up.

Senator **Murkowski**. Sure we know they were not made up. But the point in your testimony I think should include a reference.

Dr. **Hair**. You are correct, and we will reference them. You are correct.

Senator **Murkowski**. And that is what I am asking for.

Dr. **Hair**. Yes, sir, we will reference them. No problem.

Mr. **Rogers**. Senator Murkowski, I might add real quick in a comment that you are no doubt aware that the state legislature this year proposed cutting the state DEC budget by over 25 percent. Many people in the legislature have proposed abolishing the state DEC or combining it under DNR, which would render it ineffective.

Keep that in mind for what that might mean as Alaska continues to debate how to deal with its revenue situation and we get into an Arctic refuge situation. There will not be money for enforcement of hazardous wastes and other pollution problems.

Senator **Murkowski**. Well, I think the very fact that the legislature saw fit, in an area where the budget has been cut, what, 50 percent in the last two years, to still maintain a high commitment towards environmental conservation speaks for itself.

But obviously, that is something that is up to the state to address.

Dr. **Beyea**. Senator, for the record I would like to give National Audubon's position on the Department of Interior's figures. You mentioned earlier there have been some criticisms about DOI's energy figures in that area.

Our concern has not been the figures that you actually quoted, which are buried deep inside the report, but that the Department of Interior has ignored the conditional probability, that 19 percent probability. But we have no objection to the figures when you multiply them, when you multiply that 19 percent in there.

Senator **Murkowski**. Well, I do not know if you gentlemen ever heard of Mukluk, but that was going to be the big oil find. And I do not—what was it, a billion dollars was expended on that hole, and the oil companies could not get together fast enough to take a piece of the action. The only difference is there was no oil.

And that is I think significant to keep in mind as we reflect on what is before us. You know, I do not know what Congress is going to do, but chances are more often than not that you are not going to find it and that the prospects, according to the geologists, some of which I assume are still employed by the oil companies, who predicted that the best shot that they had was in Mukluk, you know, missed the boat.

Dr. **Hair**. Could I ask you a question?

Senator **Murkowski**. No, I ask the questions here.

Dr. **Hair**. Is this in your view then an all or nothing proposition? I mean, we either have full field exploration, field development, the way we have always done it, or it is nothing?

Are those the battle lines?

Senator **Murkowski**. I do not know where that kind of a conclusion—what we are talking about here is the authorization to open a million and a half acres for leasing. It is very clear, the reality is if you open it you might not find recoverable reserves that are economically viable.

Dr. **Hair**. But it is leasing with a right to develop legally?

Senator **Murkowski**. Well, of course.

Dr. **Hair**. So it is——

Senator **Murkowski**. Do you expect someone to go in and drill just for the sake of drilling? You know, that is why, obviously, the other two wells have not been drilled with the authority that Arctic Slope had.

Dr. **Hair**. I think a case could be made the national interest would be served to try and find that information out without a full leasing program, yes, sir.

Senator **Murkowski**. Well, you know, somebody indicated the effectiveness of the Federal Government in the Naval Petroleum Reserve No. 4. I am not going to debate that. Yet, we all know that the contractor was a very experienced contractor. It was Husky Oil, and the point is it did not find any oil.

So you know, we have got somewhat of a track record there.

I am going to finish these questions and then you may make comments. Do you have any reason to support—if Congress were to enact—the Federation, Dr. Hair, this is for you—a proposal for an independent study commission on ANWR, do we have any assurance that you would support the conclusions of the commission if they were contrary to your basic position, which is in opposition to opening up the area for oil and gas exploration and/or development?

Dr. **Hair**. I believe that facts are friendly, and if a commission as we are designating or a National Academy of Sciences type of study that the National Audubon Society is advocating would empower the best available unbiased scientific expertise to produce a report, people who do not have a vested interest in it, then if those facts were objectively analyzed and reach conclusions, at this preliminary stage I would say, sure, we would live with the facts.

Senator MURKOWSKI. Even though the conclusions did not—were contrary to your particular point of view?

Dr. HAIR. Our particular point of view is perhaps being misunderstood.

Senator MURKOWSKI. Perhaps.

Dr. HAIR. Our point of view is that this commission ought to be defining what ought to be the next step. It does not say——

Senator MURKOWSKI. You are not suggesting it make a determination of whether they initiate exploration?

Dr. HAIR. No. The commission, if empowered by Congress, one of the things it could do would be to have a carefully stipulated exploration phase. Here is the difference, though: We want it on structure and we want it so it reports back to Congress.

Senator MURKOWSKI. Do you think the private sector would be motivated to initiate that?

Dr. HAIR. Yes.

Senator MURKOWSKI. Well, we will ask them tomorrow and see what they say.

Dr. HAIR. Chevron sure did.

Senator MURKOWSKI. One well.

Dr. HAIR. One well, and they have made it known that one of their top priorities is to open up the Coastal Plain.

Senator MURKOWSKI. Why did they not drill the other two wells?

Dr. HAIR. Why, if you have found what you are looking for?

Senator MURKOWSKI. Well, you do not know that. I do not either.

Dr. HAIR. I do not either, I do not either. And that is one of the problems. The public is being asked to take a great leap of faith and we do not know any of the information.

Senator MURKOWSKI. That is right. If we knew it, the Federal Government might find it would not get anything for the leases.

Dr. HAIR. I think that would serve the public, because then this debate would be over with and we would have a very clear signal that we are going to protect this area for its unique ecosystem and wilderness values.

Senator MURKOWSKI. You and I both know it is pretty difficult to expect a couple of wells to be lucky enough, if indeed there are significant reserves there.

Dr. HAIR. Put them on structure in the best prospects.

Senator MURKOWSKI. Well, yes. We put them on structure in Prudhoe Bay on the best prospects.

Dr. HAIR. Off structure.

Senator MURKOWSKI. And we did not hit the first, second, third. We put them on Mukluk on the best prospect and we did not hit. So I think, again, oil is where you find it.

You are talking about air quality and there has been much to-do about it and we are going to get into it with the industry group tomorrow. But I am curious to know where you generalize your data from.

The Alaska Department of Environmental Conservation data generally indicates that ambient air quality at Prudhoe Bay is significantly better than areas impacted otherwise. There is the phenomenon of Arctic haze. We are very concerned about that phenomenon.

But to suggest that we have—and I think, Mr. Hair, you made some reference to, I think a reference to looking for a Superfund to happen. You know, that kind of theatrics is alarming.

Dr. **HAIR**. It is not theatrics.

Senator **MURKOWSKI**. You are throwing out something that we are very committed to, the Superfund concept. But to suggest this is an accident waiting to happen, that prudent people are not concerned about taking appropriate regulatory action to ensure that the risk is minimal, is the other side of the issue.

And that is why when you come up with a quotable statement of that magnitude, I think it is appropriate that it be noted in the record.

Dr. **HAIR**. You are damn right, and we have got our act together on this one, Senator. We are working with the Natural Resources Defense Council and Trustees for Alaska, and in mid-July we will be releasing a report that will document chapter and verse our concerns as environmentalists.

Senator **MURKOWSKI**. That is fine.

Dr. **HAIR**. That is what you are calling for.

Senator **MURKOWSKI**. When you use that kind of a message, looking for a place to happen, that is extreme.

Dr. **HAIR**. No, it is not. Look what happened at Time Beach. Ask the folks who had to give up their homes in Time Beach, Missouri, because of the spraying of oil on their roads.

Senator **MURKOWSKI**. And you are aware of the indigenous heron population associated with Prudhoe Bay that would have to give up their homes, God forbid, if anything like that happened.

Dr. **HAIR**. We are talking about the Arctic ecosystem and the tundra. We are talking about how the discharge of millions of gallons of waste material directly onto the tundra that we know——

Senator **MURKOWSKI**. There is not waste material directly on the tundra.

Dr. **HAIR**. The state last year showed that the effluents exceeded the discharge. Senator, you are not living in the reality of what the state is reporting.

Senator **MURKOWSKI**. Well, I think that you would recognize that there are areas where they have the disposal. But to suggest that it is just arbitrarily occurring is not factual. And I think the record will again indicate that and testimony will indicate that there are specific areas so designated for gravel, for various waste disposals. They require permitting, they require approval, and they are not haphazard.

Dr. **HAIR**. Is not the nub of this issue really not so much about the Arctic National Wildlife Refuge and Coastal Plain, but really the focal point on operations right now today on the North Slope? And the fact is we really do not know, and that is what we are saying.

Senator **MURKOWSKI**. What we do know, Mr. Hair, is that we have continued to try and improve what we have done.

Dr. **HAIR**. I agree.

Senator **MURKOWSKI**. And we have probably done a better job in that particular area of exploration than any other domestic oil field in the United States, simply because we have had to be concerned about new phenomenas.

But we have also created new techniques that you gentlemen do not give any credit to, such as an ice road, which is much better than taking gravel out and putting in a permanent road if you are doing an exploratory well and you do not come back to it.

The marks are very insignificant in relation to a road. These are advancements that can be made in the Arctic that I think deserve some recognition for the efforts.

Dr. HAIR. Every field that has been brought on line has better technology than the previous one.

Senator MURKOWSKI. That is the good news.

We have seen the mention of the causeway for the fish. The EPA has had great concern about this, whether—obviously, the fish follow the shoreline, the cisco and the other fish. The question of whether we should provide lights for the fish has even come up under the culverts in the causeway.

I mean, there is not a haphazard effort. There is a concentrated concern, a great debate over the merits of putting in a causeway, whether it will have an impact. And I think this is the type of thing that needs to be reflected in the record, the compassion and concern expressed by the state of Alaska through its Department of Environmental Conservation, the EPA, and the industry.

And of course there is going to be a debate on whether or not a causeway is going to have an effect on the passage of the fish. But the point is there is research done. Maybe it is not adequate. There are culverts put in. Maybe they need lights.

But it is not being ignored, and there continues to be this concern. And whether it is at Endicott or one of the other fields, the effort is being made.

Mr. ROGERS. I would agree that there have been many excellent examples of the industry doing a good job in the Arctic, and it is not our intent to say that they have not done a good job in many places. It is obviously not our business to point out those, and hopefully you will hear more of those tomorrow.

But at the same time, you bring up the example of ice roads. Well, show me where a permitted hazardous waste disposal site is? They do not occur.

You talk about the causeways——

Senator MURKOWSKI. We do not have any evidence from you gentlemen on the site in Kaktovik. You say that we cannot find anything and there is nothing there to be seen, and I think that speaks for itself.

Mr. ROGERS. There has been significant damage from the causeway, and the record should include some extensive pressure that was applied by the oil industries to North Slope Borough officials and others so that the causeway was the selected alternative rather than the subsea pipeline, which would have been much less damaging to the environment.

Senator MURKOWSKI. I do not know how you can say that when other environmentalists will say the danger from ice movement on a buried pipeline and the exposure to oil spill is far more hazardous from the standpoint of the ultimate potential damage than the other alternatives.

So you have got a situation where experts do have differences.

Senator **MURKOWSKI** [presiding]. Do you know factually, Mr. Rogers, the outcome of this year's calving?

Mr. **ROGERS**. Pardon me?

Senator **MURKOWSKI**. The question was, do you have any factual information as to the outcome of this year's calving of the porcupine herd?

Mr. **ROGERS**. From my firsthand experience of being up there, and I know that the herd has primarily calved in Canada.

I checked with the Fish and Wildlife Service on Barter Island before I left to verify this, to make sure I was giving factual data to the committee.

And the caribou should be moving over to the 1002 area now, as they do every year when they have calved in Canada. They do eventually move over into that area, and they do still have an important need for access to the insect relief habitats.

And I think that is something that should be brought out right up front, that we are not saying they go to that quote core area every year. And I put that in my testimony, because it is not anything worth hiding.

It is biologically proven. They go from one area to the other. And the Department of Fish and Game and the U.S. Fish and Wildlife Service, hopefully you folks will get their biologists in here.

And they will tell you with the best expertise possible exactly what happens year after year.

Senator **MURKOWSKI**. We have that. I think it is a tremendous dispersment.

Do you know why they calve in Canada?

Mr. **ROGERS**. I can give you personal experience on that, too. The coastal plain had a very long period, two weeks, of very cold weather late in the spring this year, where the fog was coming in off the arctic ice pack. It was freezing rain.

Where we were intending to go, we could not land. And basically, it was the weather conditions this year.

Senator **MURKOWSKI**. Is that your educated guess, or do you know it for a fact?

Mr. **ROGERS**. Well, I know for a fact that the weather conditions, the snow melt, was later than usual this year. And I cannot say conclusively every factor that may have caused the herd not to come over this year.

They may have realized that their calving area was in jeopardy.

Senator **MURKOWSKI**. Mr. Evans, a question with regard to balance has come into your testimony, and I find it interesting.

Let us consider your balanced approach I think it is fair to say, that you have a concern over nuclear power generation, which certainly has downsides, but it also has positive sides as far as air quality control.

The burning of coal, which has downsides. Additional hydro, which is a limited alternative, because most of that has been developed.

The further development of oil and gas resources, synthetic. How can you call this a balanced approach?

Mr. **EVANS**. The questions you are asking have been raised again and again in the debates. We started on this since 1973. I feel that our answers have been consistent all the way through, and I feel we have been proven to be right, too.

A balance does mean a much heavier emphasis on nonenvironmentally damaging measures such as conservation, which do produce oil; for example, do produce other forms of energy, too.

A balance certainly does mean, for example, more efficient use of what we already have.

A balance can also mean using other hard energy sources. It can mean using renewable resources. That is part of the whole picture, too.

Dr. Beyea next to me has prepared Audubon's energy plan, which has sustained peer review from energy industry people as well as everyone else, and has proposed such a plan, which we think is very balanced, and will save the things that we cannot get back, like the arctic wildlife range refuge; it will save these places, and will also provide us with the energy that we need and then some too.

With your permission, I would like him to explain for a couple of minutes about the Audubon energy plan.

Dr. **Beyea**. Well, I think first of all, we are mischaracterized when it is suggested that the environmental community has not considered energy alternatives.

There has been in the environmental community since the mid-1970s a number of reasonable alternatives to the traditional hard mix.

And we prepared one plan which relies on drilling for oil in something like 90 percent of U.S. land with lease stipulations, which includes certain mining of coal, which includes drilling for natural gas in, again, 90 percent of U.S. lands.

It also includes a heavy dose of energy conservation, which turns out to be cost effective for the consumer and not just for the environmentalists.

And the interesting thing is that the Audubon plan, as other environmental plans, have actually turned out to be quite conservative; that in fact what we said we were going to do, the country should do, and energy companies said was impossible, in fact, it turned out to be correct.

So at this point I think the burden is on the Administration to justify its downplaying of renewable energy and energy conservation.

Senator **Murkowski**. Thank you.

A comment was made, I think by you, Mr. Hair, with regard to Secretary Hodel and the, quote, secret land exchange discussions.

And let us take one and examine it—one that you are probably familiar with, and I am too from the standpoint of the Kodiak Regional Corporation. Kodiak Island has a bear—well, I guess you would call it a substantial number of brown bears that are basically in one area, and I gather the U.S. Fish and Wildlife Service would like very much to include I think it is about 250,000 acres of Kodiak's land that is habitated for the brown bear, the largest carnivorous animals on earth. They would like to have that in the national land control under U.S. Fish and Wildlife Service as a substantial addition to their holdings to ensure that an appropriate refuge could be developed for the bear.

Is that a meritorious and a worthwhile acquisition in exchange for that regional corporation taking a position, whatever could be negotiated, in ANWR, recognizing that the downside to it is that the Federal Government would be giving up potential revenue-producing land if the authority was granted, and ANWR was opened for exploration and leasing?

Dr. **Hair**. Our strong opposition to the land trades which you refer to have nothing to do with the merits of trade; they have everything to do with the process.

And it is our strong view that when you are talking about the public's resources, whether it is Kodiak Island, or the mineral rights——

Senator **Murkowski**. Well, just a minute now. They are not the public resources on Kodiak Island. This happens to be the regional corporation's resources on Kodiak Island.

Dr. **Hair**. But the brown bears are held in public trust.

Senator **Murkowski**. That is correct, but the land is not.

Dr. **Hair**. That is correct. It has nothing to do with the merit of those changes. There are some valuable out on the YK delta.

Senator **Murkowski**. I know. But do you support the proposed exchange, in general terms, without getting too specific.

Dr. **Hair**. Absolutely not. I fundamentally reject it out of hand because of the process around which it was produced.

Senator **Murkowski**. Well, identify, what is your objection to the process. It is an exchange.

Dr. **Hair**. Secret negotiation of the public's resources, period.

Senator **Murkowski**. Secret. Obviously, you have heard the testimony, the statements from my colleagues saying that they understood the Secretary to be saying there would be no exchange without Congressional approval.

Now if that is the case, would not that proposal have to come before Congress?

Dr. **Hair**. Secretary Hodel is very adept at explaining himself and reexplaining himself as to what it is he means.

Senator **Murkowski**. Well, let's assume that that is the case; that indeed he has stated, given you whatever assurance you want, that Congress would have to approve.

My question to you, sir, is do you support that type of an exchange from the standpoint of the addition to the national treasury of our country, and the intrinsic value of having that associated with a wildlife habitat?

Dr. **Hair**. I categorically suggest that approach that he has used.

Senator **Murkowski**. Okay, what do you suggest?

Dr. **Hair**. I suggest that we have a public process.

Senator **Murkowski**. That we go out and buy it?

Dr. **Hair**. No, that we have a public process to define how it is that we are going to go about trying to decide what are the parameters.

Senator **Murkowski**. Now just a minute, I am telling you, the public process would be Congress. If it were the Congress, would you concur that it is in the national interest or not?

Dr. **Hair**. I think Congress ought to articulate a set of guidelines which then we go back to square one and we start over again.

That process has lost so much confidence from all quarters; it is of no value.

Senator MURKOWSKI. Well, I know, but it is either going to come before Congress or it is not.

And I am saying, if it does, Congress and my colleagues are going to spend an extraordinary amount of time making sure that it is in the public interest.

Now, that is the best balance you have. Some of them are going to say, we need an evaluation; we need a study, and so forth. It all goes into the mill and comes out.

And if it comes out in the sense of a public evaluation and concurrence, do you support it?

Dr. HAIR. Does it not strike you as just a little bit curious that we had to go to court to sue the Department of Interior to have public hearings on the draft 1002 report? Is that an open and caring government?

Senator MURKOWSKI. I have asked you the question, and you may refuse to answer.

Dr. HAIR. No, I do not refuse to answer.

Senator MURKOWSKI. Well, I am asking you, assuming it is the Congress of the United States that has to approve the terms and conditions, would you generally support the concept?

Dr. HAIR. If the Congress of the United States has articulated in advance a process that involves legitimate input by the public at every step of the way, not just when it arrives on Capitol Hill.

Senator MURKOWSKI. Thank you. I am wondering if I could ask you if you, basically, Mr. Rogers, have had an opportunity to review the governor's proposal and general testimony in support of ANWR with certain conditions that there be a seven-year study period; once they generally determined what the alleged calving area was, and then it come back to Congress for a veto.

And then the Catch-22 that appears out of that scenario, where I think it was the State's position that they did not object to exploration because they felt that would occur in the winter time, but the concern was what effect production would have if it occurred in an area where there was concentrated calving. Then there is the reality that if you did not know really what took place on various parcels, and you assimilated development so you could study it, would you really be able to make a scientific evaluation of whether the displacement occurred by natural phenomenon or because the assimilations were there?

Mr. ROGERS. I am aware of the governor's position, and what has taken place there.

Is there a specific question you are asking?

Senator MURKOWSKI. Well, I am asking what your opinion is, whether you support it or do not support it?

Mr. ROGERS. I think the governor has taken what is in his mind a much more rational approach for what is best for all of Alaska.

At the same time——

Senator MURKOWSKI. Do you support it?

Mr. ROGERS. I am answering that question. At the same time, the Alaska Department of Fish and Game, when it submitted its recommendations to the governor, gave three key areas that deserved deletion from the oil leasing. That involved the core calving area; the critical insect relief habitat; and the fished over wintering area.

Senator MURKOWSKI. Would you identify the core calving area, then?

Mr. ROGERS. Pardon me?

Senator MURKOWSKI. Would you identify, if you can, the core calving area you are referring to?

Mr. ROGERS. Yes, I will identify it according to the Fish and Wildlife Service maps.

Senator MURKOWSKI. No, you are talking about the State Department of Fish and Game, I think that was your statement.

Mr. ROGERS. Right. And they were referring to the core calving area as listed in the draft 1002H report, which as you aware, no longer exists in the final 1002H report.

Okay, now whether you call it the core area or the concentrated area, they felt that that area should be protected.

The net is that I do not feel that the governor adopted enough of what really should be incorporated into the State's position to provide better protection to the wildlife values of the refuge.

And even at that, if he would have adopted everyone of the recommendations of Fish and Game and Department of Environmental Conservation, he still left out the wilderness characteristics from the formula.

And as you are well aware, our organization strongly advocates protection.

That is a roundabout way of telling you that, no, I do not support the governor's position, but I think it is a much more rational approach.

Senator MURKOWSKI. Speaking of rational, can you help me understand how we get over the Catch-22 on putting simulations up where we think that the area of calving is most likely to occur?

How can we scientifically evaluate whether the simulations will have an impact on the migration or not?

Mr. ROGERS. You are asking me how can we conclusively say that there is this core calving area and how important it is?

Senator MURKOWSKI. No. I am saying, the governor's concern is production. His explanation is generally that exploration will occur in the winter, and there is nothing permanent associated with the exploration as there is with production.

So until you have production, you are really not going to know what the impact will be unless you can examine the areas ahead of time, and there is some identification of those areas now.

So his suggestion was that you put up simulations. In other words, go in and put some activity there, false activity of some kind. Phony oil wells. Phony pipeline. Phony road. To determine whether this is going to basically be representative of production, and whether the caribou will stay away from the area.

I am asking you, do you think you can tell?

Mr. ROGERS. I do not know exactly what the governor has in mind. I have only see a few press accounts——

Senator MURKOWSKI. Well, all I can refer to is what his testimony said.

Mr. ROGERS. But my opinion is that that does not really sound like a very plausible approach; that I think if under the governor's scenario, if you have got most of the 1002 area open, and admittedly, we all know the caribou go to different areas at different times, that if you keep what is identified in the draft report as the core area closed, you can get a better idea of the interaction of large aggregations of caribou, up to 80,000 which we have not seen with the central caribou herd, an oil development.

And you could get a much better idea from that what might happen in the core area.

As far as constructing false facilities, I really do not know much about it.

Senator MURKOWSKI. Okay, I was just asking for your opinion of the statement.

What is the data that supports your testimony on page 3 regarding the survival rate of caribou calves, and is not that statistic basically from a one-year study? And is that not somewhat inconsistent to rely on a one-year study from your particular point of view?

And yet you claim that there has not been enough study on other issues?

Mr. ROGERS. No, that is not statistics from a one-year study. That involves statistics from 1982, 1983, 1984 and 1985, and it was basically—it is from the U.S. Fish and Wildlife Service, wildlife biologists, and it was prepared in putting together some information at the request for Mark Fraker for Standard Alaska Production Company.

And I am sure that you are going to hear tomorrow their version of what this data means. But it is publicly available. I have a copy I would be happy to provide you with.

Senator MURKOWSKI. If you would care to include it in the record, we would be happy to have it.

Mr. ROGERS. Sure.

[The information follows:]

IN REPLY REFER TO:

United States Department of the Interior
FISH AND WILDLIFE SERVICE
ARCTIC NATIONAL WILDLIFE REFUGE
FEDERAL BUILDING & COURTHOUSE
101 12th AVENUE, BOX 20
FAIRBANKS, ALASKA 99701 – 6267

May 19, 1987

Mark Fraker
Standard Alaska Production Company
900 E. Benson Blvd.
Anchorage, Alaska 99519-6612

Dear Mark:

Enclosed are data regarding the distribution of radio-collared adult females of the Porcupine caribou herd during calving for the years 1983, 1984, and 1985. The assumptions and calculations which were used to estimate caribou densities are also included. References for 1983 and 1984 are the baseline update report series which you have a copy of. The 1985 update reports are in the final stages of preparation.

In general the data indicate higher densities of caribou in the designated concentration areas. The Alaskan concentration constituted the bulk of the calving populations and contributed most of the productivity that occurred during these years. The Alaskan calving areas are used most frequently by most of the calving caribou.

Because the 1985 data have not been fully reported, and we have not completed our analysis of the multi-year data, we suggest that these data be considered as preliminary.

If you have any further questions regarding these data or interpretations of it, please contact us.

Sincerely,

Glenn W. Elison
Refuge Manager

cc: Larry Pank, Alaska Fish & Wildlife Office of Research
Ken Whitten, Alaska Department of Fish and Game

Estimated Number and Density of Caribou on the Calving Grounds of the Porcupine caribou herd, 1983- 1985[1].

1983

Location	Adult Females	Calves	yearlings	Total Caribou	Density (caribou/mi^2)
Jago	14175	11340	1080	26595	32.7
Kongakut	14175	11340	1080	26595	78.3
Subtotal (Conc. Areas)	28350	22680	2160	53190	
Peripheral	18426	14742	3240	36408	18.9
Total	46776	37422	5400	89598	

1984

Location	Adult Females	Calves	yearlings	Total Caribou	Density (caribou/mi^2)
Niguanak	9908	7926	775	18609	98
Aichilik	11994	9596	775	22365	81
Stokes Pt.	5215	4172	775	10162	54
Subtotal (Conc. Areas)	27117	21694	2325	51136	
Peripheral	25032	20025	3576	48633	8.8
Total	52153	41723	5901	99777	

1985

Location	Adult Females	Calves	yearlings	Total Caribou	Density (caribou/mi^2)
Jago	32340	25872	1320	59532	65
Stokes Pt.	8663	6930	1320	16913	69
Subtotal (Conc. Areas)	41003	32802	2640	76775	
Peripheral	16748	13398	3960	34106	16.3
Total	57751	46200	6600	110881	

[1] Numbers and densities are estimated according to the proportion of radio-collared adult female caribou found in calving grounds location during the calving season (Appendix I and II). Areas of calving concentrations and peripheral areas were derived from digitized maps (1:250,000 scale).

APPENDIX I

Assumptions:

1. The distribution of radio-collared adult female caribou are representative of that segment of the herd at the time of calving.

2. The population of the Porcupine caribou herd was 135,000, 149,000 and 165,000 in 1983, 1984 and 1985 respectively (Whitten 1987).

3. Adult females (3+ years old) make up 35% of the total population (Whitten and Cameron 1981).

4. The natality rate is 80% (Bergerud 1980).

5. Yearlings make up approximately 12% of the total Porcupine caribou herd population (Whitten and Cameron 1981).

6. One-third of the yearlings occur on the calving grounds at calving time and up to 60% of these occur in peripheral areas with the remainder in concentration areas (Whitten et al. 1984 and field observations).

Literature Cited

Bergerud, A.T. 1980. A review of the population dynamics of caribou and wild reindeer in North America. Pages 556-581 in E. Reimers, E. Gaare and S. Skjenneberg, eds. Proc. Second Int. Reindeer/Caribou Symposium, Roros, Norway. 799pp.

Whitten, K.R. 1987. Population status and trend of the Porcupine caribou herd, 1982-1985. Alaska Dep. of Fish and Game Inter. rep. in G.W. Garner and P.E. Reynolds, eds. 1986 update report baseline study of the fish and wildlife, and their habitats. U.S. Fish and Wildl. Serv. Anchorage, Ak.

Whitten, K.R., and R.D. Cameron. 1981. Caribou survey-inventory report. in R.A. Hinman, ed. Annual Rept. of Survey and Inventory Activities. Alaska Dept. Fish and Game. Fed. Aid in Wildl. Rest. Rept. Proj. W-19-1 and W-19-2, Job No. 3.0, 1.0, and 12.0. Juneau.

Whitten, K.R., G.W. Garner, and F.J. Mauer. 1984. Calving distribution, initial productivity and neonatal mortality of the Porcupine caribou herd, 1983. Pages 359-420 in G.W. Garner and P.E. Reynolds, eds. 1983 update report baseline study of the fish, wildlife, and their habitats. U.S. Fish and Wildl. Serv., Anchorage, Ak. 614pp.

APPENDIX II

Calculations:

1983

1) 135,000 (1983 total population) x .35 (proportion of adult females) = 47,250 = total adult females on the calving grounds.

2) 47,250 x .8(natality rate) = 37,800 = total calves born

3) 135,000 x .04 (proportion of yearlings) on the calving grounds = 5,400 = total yearlings on the calving ground.

7/23 (30%) of r-collared adult females occurred within the Jago concentration
7/23 (30%) of r-collared adult females occurred within the Kongakut concentration
9/23 (39%) of r-collared adult females occurred within the remaining peripheral areas

Total caribou within the Jago concentration:
.30 x 47,250 = 14,175 adult females
.8 x 14,175 = 11,340 calves
.2 x 5,400 = 1080 yearlings
26,595 Total caribou

Area of the Jago concentration = 2108km^2
Density = 26,595 caribou/2108 km^2 = 12.6 caribou/km^2 or 32.7 caribou/mi^2

Total caribou within the Kongakut concentration:

.30 x 47,250 = 14,175 adult females
.8 x 14,175 = 11,340 calves
.2 x 5,400 = 1,080 yearlings
26,595 Total caribou

Area of the Kongakut concentration: 880 km^2
Density = 26,595 caribou/880 km^2 = 30.2 caribou/km^2 or 78.3 caribou/mi^2

Total caribou within peripheral areas:
.39 x 47,250 = 18,426 adult females
.8 x 18,426 = 14,742 calves
.6 x 5,400 = 3,240 yearlings
36,408 Total caribou

Area of peripheral area: 4999 km^2
Density = 36,408 caribou/4999 km^2 = 7.2 caribou /km^2 or 18.7 caribou/mi^2

1984

149,000 (Total 1984 population) X .35 = 52150 adult females on calving grounds
52,160 x .8 (natality rate) = 41728 total calves born
149,000 x .04 = 5960 total yearlings on the calving ground

6/31 (19%) of radio-collared adult females occurred within the Niguanak Concentration

7/31 (23%) of radio-collared adult females occurred within the Niguanak Concentration Aichilik Concentration
3/31 (10%) of radio-collared adult females occurred within the Niguanak Concentration Stokes Pt. Concentration
15/31 (48%) of radio-collared adult females occurred within the Niguanak Concentration peripheral areas

Total caribou within the Niguanak Concentration:
.19 x 52150 = 9908 adult females
.8 x 9908 = 7926 calves
.13 x 5960 = 775 yearlings
18,609 Total caribou

Area of the Niguanak area: 511 km^2
Density= 18609 caribou/511 km^2 = 36 caribou/km^2 or 98 caribou/mi^2

Total caribou within the Aichilik Concentration:

.23 x 52,150 = 11,994 adult females
.8 x 11,994 = 9,596 calves
.13 x 5,960 = 775 yearlings
22,365 Total caribou

Area of Aichilik Area = 746 km^2
Density = 22,365 caribou/746km^2 = 30 caribou/km^2 or 81 caribou/km^2

Total caribou within the Stokes Pt. Concentration:

.1 x 52,150 = 5215 adult females
.8 x 5,215 = 4172 calves
.13 x 5,960 = 775 yearlings
10,162 Total caribou

Area of Stokes Pt. Area = 508 km^2
Density = 10,162 caribou/508 km^2 = 20 caribou/km^2 or 54 caribou/mi^2

Total caribou within the Peripheral Areas:

.48 x 52,150 = 25,032 adult females
.8 x 25,032 = 20,025 calves
.6 x 5,960 = 3576 yearlings
48,633 Total caribou

Area of Peripheral Areas: 14,234 km^2
Density = 48,633 caribou/14,234 km^2 = 3.4 caribou/km^2 or 8.8 caribou/mi^2

1985

165,000 (Total 1985 population) x .35 = 57,750 adult females on calving grounds.

57750 x .8 (natality rate) = 46200 calves born
165,000 x .04 (yearlings) = 6600 yearlings on calving grounds

31/55 (56%) of radio-collared adult females occurred within the Jago Concentration.
8/55 (15%) of radio-collared adult females occurred within the Jago Concentration Stokes Point Conc.
16/55 (29%) of radio-collared adult females occurred within the Jago Concentration Peripheral area

Total caribou within the Jago Concentration:
.56 x 57750 = 32340 adult females
.8 x 32340 = 25872 calves
.2 x 6600 = 1320 yearlings
59532 Total caribou

Area of Jago Concentration = 2386 km^2
Density = 59532 caribou/2386 km^2 = 25 caribou/km^2 or 65 caribou/mi^2

Total caribou in Stokes Point Concentration:
.15 x 57750 = 8663 adult females
.8 x 8663 = 6930 calves
.20 x 6600 = 1320 yearling
16913 Total caribou

Area of the Stokes Pt. Concentration = 634 km^2
Density = 16913 caribou/634 km^2 = 27 caribou/km^2 or 69 caribou/mi^2

Total caribou in the Peripheral Area:
.29 x 57,750 = 16,748 adult females
.8 x 16,748 = 13,398 calves
.6 x 6,600 = 3,960 yearlings
34,106 Total caribou

Area of Peripheral Area = 5,412 km^2
Density = 34,106 caribou/5,412 km^2 = 6.3 caribou/km^2 or 16.3 caribou/mi^2

Location and Productivity of Radio-collared Adult Female Caribou on the Calving Grounds of the Porcupine caribou herd, 1983.

Location	Total R-collared Females Present	Parturient Females	Within Area Productivity (%)	Percent of Total Productivity
Jago Concentration Area	7	6	86	33.3
Kongakut Concentration Area	7	6	86	33.3
Subtotal (Concentrations)	14	12	86	66.6
Remaining (Peripheral Area)	9	6	66	33.3
Total	23	18	86	99.9
Inside 1002 Study Area	13	11	85	61
Outside 1002 Study Area	10	7	70	39
In Alaska	21	17	81	94
In Canada	2	1	50	06

Location and Productivity of Radio-collared Adult Female Caribou on the Calving Grounds of the Porcupine caribou herd, 1984.

Location	Total R-collared Females Present	Parturient Females	Within Area Productivity (%)	Percent of Total Productivity
Niguanak Concentration Area	6	6	100	26
Aichilik Concentration Area	7	7	100	30
Stokes Pt. Concentration Area	3	3	100	13
Subtotal (Concentrations)	16	16	100	70
Remaining (Peripheral Areas)	15	7	47	30
Total	31	23	74	100
Inside 1002 Study Area	9	9	100	39
Outside 1002 Study Area	22	14	64	61
In Alaska	20	18	90	78
In Canada	11	5	45	22

All radio-collared females of the Aichilik Concentration Area entered the 1002 study area during the period of 10-19 June thus, the post calving use of the 1002 study area is equivalent to the In Alaska data column.

Location and Productivity of Radio-collared Adult Female Caribou on the Calving Grounds of the Porcupine caribou herd, 1985.

Location	Total R-collared Females Present	Parturient Females	Within Area Productivity (%)	Percent of Total Productivity
Jago Concentration Area	31	25	81	69
Stokes Pt. Concentration Area	8	6	75	17
Subtotal (Concentrations)	39	31	79	86
Remaining (Peripheral Areas)	16	5	31	14
Total	55	36	65	100
Inside 1002 Study Area	27	22	81	61
Outside 1002 Study Area	28	14	50	39
In Alaska	37	30	81	83
In Canada	18	6	33	17

Survival Rates of R-collared Calves
(Capture → 30 June)

Year	Survived/Total		%		Calving Location
1982	11/19	=	58		CANADA (E. of Firth R.)
1983	60/65	=	92	3yr avg = 90%	Jago uplands + c. plain
1984	56/60	=	93		Niguanak Hills + Aichilik-Kong C.p.
1985	55/65	=	85		Jago uplands + c. plain

AK (mostly 1002 area) : 90% survival through June
Canada : 58% " "

1983 - 1985 Calf Mortality Study :

Mortality Rate Outside 1002 area = 1.7X that Inside 1002 area

* Indicates greater survival benefits of habitat in 1002 area + lower survival outside.

* If calving is displaced outside 1002 to south/and or east - exposure to greater predation loss likely based on above data.

References

1982 Mauer et al. 1983 (Baseline Update Rpt.)
1983 Whitten et al. 1984 " "
1984 " " 1985 " "
1985* Whitten et al. 1987 " "
* In press - Data presented at AK Senate Resources Hearings Anchorage AK 14 M[illegible] '87 by W. Regelin.

Locations + Productivity of R-collared Females

1983

	In 1002	Out 1002	AK	CAN
Productivity w/in area (1)	85%	70%	81%	50%
Productivity (%) of Total (2)	61%	39%	94%	6%

1984

	In 1002	Out 1002	AK	CAN
(1)	100%	64 %	90%	45%
(2)*	39%	61 %	78%	22%

* Most of females calving outside 1002 area moved into 1002 area 1 wk after calving

1985

	In 1002	Out 1002	AK	CAN
(1)	81%	50%	81%	33%
(2)	61%	39 %	83%	17 %

References

1983 }
1984 } Whitten et al. 1984 + 1985 Baseline Update Rep'ts

1985 - In Press -

Senator **Murkowski**. Mr. Rogers, I wonder if you have any idea what price would be necessary to be achieved before the West Sak field would produce in the sense of the economics?

I am told it might be as high as $40 to $50 a barrel. And the question comes to mind, where do we get the oil we need prior to the time that the price would get that high?

Mr. **Rogers**. Well, of course you are aware that the Department of Interior's estimates for what would be economically feasible within the arctic refuge is based on $33 to $42 to barrel oil, so we are not all that far away.

I do not know exactly at what point West Sak becomes more viable. The point I am trying to make there is that we need to do all we can to develop technologies and use the existing oil reserves before we sacrifice some of our best wildlife wilderness areas.

And that should take place first. And perhaps it is worth paying a slight bit more for that oil, if necessary, to get that out, rather than sacrificing the conservation values of the arctic refuge.

Senator **Murkowski**. Mr. Hair, it is my understanding that it might be a fair statement to suggest that your report on the coastal plain is significantly better than the Department of Interior's?

Dr. **Hair**. That is a fair assumption.

Senator **Murkowski**. And I assume part of that is because it is your report?

Dr. **Hair**. That is an accurate assumption.

Senator **Murkowski**. Have you had an independent critique of the report from the standpoint of its accuracy or thoroughness?

Dr. **Hair**. Have we sent it out for a large panel of peer review, is that what you are suggesting?

Senator **Murkowski**. Well, I am just saying an independent critique, is what I am saying.

Dr. **Hair**. We have not sent it to a panel of peer reviewists, no.

Senator **Murkowski**. Do you intend to do that?

Dr. **Hair**. We are sending right now the report that we are preparing to submit to Congress on the environmental impact of ongoing operations.

It is out at a panel of peer reviewists right now reviewing it.

Senator **Murkowski**. I know. But I am having a hard time here. Is it going to an independent panel of scientists?

Dr. **Hair**. Toxicologists, yes sir. We stand behind these numbers.

Senator **Murkowski**. Can you identify those? Have you selected them?

Dr. **Hair**. They are being selected right now.

Senator **Murkowski**. I guess the record is going to be open for awhile. Will you supply that for the record?

Dr. **Hair**. We will supply it with the report, who it has been reviewed by.

Senator **Murkowski**. With the report.

Dr. **Hair**. We will stand behind every fact in this report too, Senator.

Senator **Murkowski**. And I wonder if anyone is more pleased than the court report.

Mr. Rogers, have you had an opportunity to read Dr. Bergerud's comments and articles on caribou in general, and his, I think it fair to say, observation that they're pretty easily not displaced but kind of move away from an activity; that not a great deal bothers them.

I have seen his studies concerning caribou in Europe. I guess the war games. He says that over 20 or 22 years, he has observed them, and they do not seem to pay much attention.

He indicates that he has observed them down on the delta area where there is a lot of activity; helicopters come down. Pretty soon, they did not seem to have much interest in the activity around them.

He depicts gunny sacks blowing in the breeze as something strange to them, and they move away. But something like a road or a pipeline, as long as it does not cause them harm, they do not seem to be too distracted.

On the other hand, if a snow machine comes up, and there are gunshots fired, why, they become excited.

I am just wondering how you would characterize his evaluation, and the lifetime he spent with the caribou in Europe, Canada, and Alaska?

Mr. ROGERS. Well, yes, I have read some of his. I would not make the claim that I have read every report he has put out word for word.

I have followed his data as well as the data of a number of caribou biologists. I think he has got some very accurate points there, and there is truth to the fact that caribou are adaptable to a variety of circumstances.

I would say that I place the best faith in caribou data in the group of caribou biologists that was convened by the U.S. Fish & Wildlife Service in preparation of the draft 1002 report, which are the very group that said that the core calving area should be deleted, and in fact existed; and was not consulted the second time around when the Department of Interior made their final decisions for such a major alteration.

That group of caribou biologists together as a whole is the best source of information.

I think there are a lot of good caribou biologists.

Senator MURKOWSKI. And Dr. Bergerud would be among them?

Mr. ROGERS. Yes.

Senator MURKOWSKI. And the fact that his input was not included, I gather, in anybody's report. I assume you did not get any information from him? And I assume that the Department of Interior did not either.

Mr. ROGERS. The Department of Interior had all that data when they prepared the draft as well as the final.

Senator MURKOWSKI. He was not one of those in this group of scientist biologist group that came out with the first recommendation in Interior's report, was he?

Mr. ROGERS. I cannot recall the exact list of names. But I know there was Canadian Wildlife Service, Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, and industry biologists.

Senator MURKOWSKI. I would stand corrected. If memory serves correctly, he was not.

And I appreciate your description of his reference to the adaptability of the caribou, and I think that was the point that he made, and I found it very interesting, because obviously, it represents the opinion of a person who does not appear to have any axe to grind, who happens to be a Canadian, and he certainly spent a lot of time with those animals.

Mr. ROGERS. Yes, I think that is true. But I think it should be kept in mind that you are talking about the adaptability of individual caribou, not a major migratory herd.

Senator MURKOWSKI. Well, I am sure you have heard enough from me. And I apologize for keeping you. This is one of the dangers of having a Senator from a particular State affected left with the gavel. You always run afoul of making sure that you accommodate his attempts to put together a record.

And I think your statements have certainly been complete. I want to thank you for contributing.

I think your point of view for the record, which I think is important for the balance and the necessity of having full information.

This is an oversight hearing, as opposed to a hearing on a specific piece of legislation. So I think really anything is fair game, and I think that is what we have had today.

So I wish you and your associates well, thank you for your testimony.

And I can truthfully say, I do not have an unspoken thought at this time.

[Whereupon, at 2 p.m. the hearing recessed to reconvene Friday, June 12, 1987.]

[Subsequent to the hearing the committee received the following:]

ALASKA
COALITION

'To Preserve Alaska's National Interest Wildlands'

June 19, 1987

Hon. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

ATTN: Tom Williams

Dear Mr. Chairman:

Enclosed are a series of documents intended to respond to questions raised at the June 11 hearing concerning the Arctic National Wildlife Refuge, Alaska. Please include them in the hearing record.

Attached are:

1) A copy of the staff minutes of the Alaska Regional Office, Fish and Wildlife Service. This responds in part to Senator Ford's questions regarding scientific knowledge of impacts on caribou and our contention that political pressures were responsible for the changes between the draft and final 1002 Report environmental impact statements. Please note the discussion on page 2 of the meetings in Ottawa with Canadian government representatives. Director Gilmore goes on to discuss the difference between "and" and "or," although either word implies a worst case situation of 40% caribou population decline. Moreover, the final report did not quibble about "and" and "or;" it baldly denied any environmental harm to caribou. Finally, the tone of discussion clearly indicates a line officer of the agency informing his staff that their information was not welcome at the top and it would be changed.

2) Pages 105-112 of the draft environmental impact statement. This is a good compilation of the studies requested by Senator Ford. A full reading of this section will show that the conclusion reached on page 112, "a 20-40 percent" population decline, was not a haphazard or unsubstantiated statement that could be corrected by simple editing changes. Rather, page 106 discusses

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the dangers of comparing Prudhoe Bay conditions with ANWR and discusses the end of calving at Prudhoe and discusses increases in caribou production as a result of "high calf survival" and "relatively light hunting pressure."

Page 107 discusses the definition of and extent of the "core calving area" and "concentrated calving area" and the studies where "maternal caribou groups" avoided habitat "within approximately 2 miles" of development (repeated on p. 108).

On page 109, the report discusses difficulties which may lead to avoidance of specific tracts of habitat on the coastal plain totaling more than 300,000 acres.

3) A May 19, 1987 letter from Arctic Refuge Manager Elison discussing the studies on calving completed by the government for 1983, 1984 and 1985.

4) A report entitled "Impacts of Human Developments and Land Use on Caribou: A Literature Review, Vol. II" (1986) which discusses the known extent of knowledge of the developments in the Central Arctic and its impacts on caribou.

Of course, similar analyses were contained in the draft 1002 report for a number of wildlife species. While caribou are the most studied of the various wildlife species on the refuge, the report reached similar conclusions concerning mortality for other important components of this ecosystem.

Thank you for this opportunity to provide this information to the Committee and to make it part of the hearing record.

Sincerely,

Tim Mahoney
Chairman

Enclosures

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. TUDOR RD.
ANCHORAGE, ALASKA 99503

IN REPLY REFER TO:

Staff Minutes - Anchorage, Alaska - February 10, 1987

Distribution: Alaska Stations; Regions 1, 2, 3, 4, 5, 6, & 8; DFC; WDC

EXECUTIVE DIRECTION

Regional Director Gilmore: Good morning. There are a number of things that the Region needs to be aware of today. First off, between now and about the end of April there will be much discussion about budget. Keep in mind that the 1988 budget hearings for the Senate and the House are scheduled for April 8 and 9. This is the time when the conservation organizations in particular will be asking about what we requested in the 1988 budget and what we did not receive. Remember, when talking to the conservation groups that we are responsible for maintaining the President's budget.

At this point we have not received a copy of the 1988 budget book, but as soon as we do, it is imperative that we make copies of the wording that was used when we put this book forward -- explaining why we didn't need the $300,000 for environmental education on the Delta; why we didn't need $1,200,000 for Accelerated Refuge Maintenance and Management; and why we didn't need some other monies. Now, you have to recognize that even though we do need these monies, someone in the structure has said they were not high enough priority to be funded, and the language that we put together supports that position. Because the budget is now up on the Hill, it is public information. What Fish and Wildlife Service did; what the Department did; and what the Office of Management and Budget did is available to any organization that wants it. Remember, when someone asks how much money you need there is a risk when you answer by saying I need so much; and there's not much risk when you say that we have enough money to do our job. You are going to come face-to-face with this issue, and I will again remind you that you are responsible to maintain the President's budget.

Last Friday the State held hearings in Juneau on the 1002(h) area and what their position should be with regards to opening or not opening this area. There is another set of hearings this Friday and I will be attending these. The hearings are set up to discuss the 1002(h) report, but I have been lead to believe that probably the first two questions will be on the 1002(h) report and the next hundred will probably be on the land exchange. The State, and I'm not being critical of the State at all, finds itself in two different places and is having difficulty maintaining the balance. They do not wish to lose their share of oil royalties, which is 90/10, yet they would also like to be involved in the land exchange. I will be trying to add as much dimension to the land exchange as I can, so that the State can understand basically what is happening. I think these hearings can be of some help, and there will probably be many more hearings between now and May.

There will be public meetings on the Porcupine caribou agreement. I'm looking for a schedule from Wildlife, and I need this fairly quickly because this schedule may have to be modified rather drastically due to the fact that the President is meeting with Canadian Prime Minister Mulroney the first week in April. The caribou agreement may in fact be signed at that level. Since the agreement is getting a lot of consideration from the White House, we may have to schedule public meetings earlier. The public meetings will be designed to explain what the agreement is, what it does, and to answer questions. The meetings will not be to accept comments as in a public hearing.

Now, all of this links together. We move from the caribou agreement with Canada to their official comments on the 1002(h) report. Although we had some indication that the Canadians might go 100 percent one direction or the other, their comments came as a little bit of a surprise. When Secretary Horn, Assistant Secretary Recce, and I met with the Canadian government in Ottawa a week ago, their opening sentence was, "we strongly recommend that the 1002(h) area be made wilderness." They then went on from there to justify this position. Unfortunately, and somewhat our fault, there are some statements in the 1002(h) report that ended up there as a result of editing and not as a result of changes in policy, strategy or information. It was just editing basically that caused a couple of statements that may of in fact helped Canada reach the decision that they did, and a lot of other people also. I would like to speak to one statement right now because I want you to have a basic understanding of the statement that's in there which everyone seems to have pointed out. It's on page 112, and it indicates that there will be a population decrease and some population displacement of up to 20 to 40 percent among the caribou. Until the last draft there was an or between those two, and as a result of an editing change we now have a statement in there which has convinced everyone and his brother that if we have oil and gas development on the Arctic Refuge we are going to decrease the caribou populations there 20 to 40 percent. Let's face it, if that were that case development would be unacceptable, and there would not have been a recommendation for development. As a result of this, we have had to do a lot of work to figure out how we got to that point. For the record, as best that I can get all the specialists to tell me, we cannot predicate a number or an extent of any population decrease that might come about as a result of the draft scenario that is in the 1002(h) report. And I make some emphasis on this draft scenario. The draft scenario in the report shows a development that develops the entire area at once; not as an oil field might be developed - in a serial kind of development. It would hardly be reasonable to believe that they would descend on that place and develop everything simultaneously, and that's what the report analyzed. So, there are some approaches that we used in our own report, which in fact if they were true the development would be unacceptable. So, we will be in the process of rewriting, and we will be in the process of clarifying these issues that we ourselves created. Some biologists and others who know the area will say that there may be a decrease if the displacement is severe, and if the displacement and the movement may cause a drop-off in reproduction.

We have a meeting with the Director the end of this month (February 26 and 27). The first day of that meeting will be to discuss budget issues - what are the issues for the Fish and Wildlife Service in the budget arena. The second day will be a Regional Director's meeting with the Director, in which we will discuss how to better manage the Service.

what methods, without seriously affecting fish, wildlife, and habitat that rely on the spring. However, the existing "no surface occupancy" restriction for oil exploration and development is assumed to remain in effect. This precludes surface development and disturbance, maintaining the area's physical features and important fish, wildlife, and subsistence resource values.

Conclusion

Development as a result of fully leasing the 1002 area would have negligible effects on the Sadlerochit Spring Special Area under current protective management regulations.

COASTAL AND MARINE ENVIRONMENT

Petroleum development and production in the 1002 area and associated transportation at both onshore and offshore sites would have a variety of effects. Docks and causeways can affect dispersion, nutrient transfer, temperatures, salinities, invertebrate abundance and diversity, fish passage, and other uses of those areas by fish and wildlife. Disruption of natural nearshore currents can result in sea water intrusions into lagoons causing lower water temperatures and higher salinities. Salinity and temperature changes could alter invertebrate abundance; decreases in invertebrates would mean lower coastal area values to fish and wildlife. Such intrusions may also alter fish movements by reducing existing favorable habitat conditions in nearshore zones.

Noise created by construction and other operations in coastal areas could be a disturbance factor, sufficiently reducing the quality of the coastal and marine habitats to cause avoidance by some marine birds and mammals.

Debris washing ashore from transport and offshore activities could increase with increased human activities in the area. The driftline is used for nesting habitat by several species of waterfowl and seabirds (pl. 3A, B, C). Disruption and physical alteration of the driftline from activities associated with oil development could affect bird nesting success by disturbing nesting birds or altering their nests. Debris and disruption of driftlines would also affect esthetics. Occasional fish and wildlife mortalities could occur where animals become entangled in or ingest debris.

Any spill of oil or other hazardous materials along the coast could severely affect coastal and marine habitats and fish and wildlife. For example, decreased invertebrates result in decreased food for fish and wildlife. Sea ducks, such as oldsquaw which heavily use this coastal area, could be displaced, and direct mortality could occur. Level of impact would relate to the volume of oil spilled, location, effectiveness of cleanup, time of year, and fish and wildlife species present.

Mitigation

Experience gained from construction and operation of docks and causeways for Prudhoe Bay should be used to plan and construct docks and causeways for the 1002 area so that those facilities do not affect longshore water transport and lagoon water chemistry or impede fish movements. Release of fuels and other hazardous substances to the environment should be minimized by developing and implementing control, use, and disposal plans for such substances.

Conclusion

Overall, the effect of full leasing is anticipated to be minor on coastal and marine habitats. However, there is a small probability of major adverse effects depending on the extent and duration of future cumulative developments or in the event of a catastrophic offshore or coastal oil spill.

TERRESTRIAL MAMMALS

CARIBOU

Caribou use the 1002 area during the summer months for two important activities, calving and seeking relief from insect harassment. During that period, 3,000-4,000 caribou from the 12,000-14,000 member CAH use the 1002 area. Up to 82 percent of the calving caribou in the PCH calved on the 1002 area in recent years (1972-85) and the entire 180,000-member PCH may use the area in some years, mainly during the late June/early July insect-relief period. Concentrations of caribou are generally absent from the 1002 area in winter, except for as many as 1,000 animals (7 percent) of the CAH scattered between the Sadlerochit Mountains and Camden Bay.

Exploration

Winter seismic programs in 1984 and 1985 on the 1002 area, and exploratory drilling on adjacent Kaktovik Inupiat Corporation (KIC)/Arctic Slope Regional Corporation (ASRC) lands in the winters of 1985 and 1986, resulted in no apparent conflict with CAH or PCH activities. Similar results were found during both seismic and exploratory drilling work in the NPRA and on State lands within the range of the CAH (U.S. Bureau of Land Management, 1983; Fancy, 1983). Winter oil exploration, including exploratory drilling, would likely have a negligible effect on PCH caribou since they are generally absent from the area. Disturbance, resulting in displacement, could occur to the CAH. Disturbance and displacement to both the CAH and PCH from the short-term, scattered and local activities of summer surface geology programs would be almost negligible.

Production, Transportation, and Development

Effects on caribou from petroleum field development, production, and transportation would occur from direct habitat modification, indirect habitat loss (displacement, barriers to movement which reduce access to insect-relief and other habitats, and disturbance/harassment), and direct mortality (e.g., hunting, collisions with vehicles, or other accidents). Analogies comparing the effects of current oil development on the CAH and effects of potential 1002 area development on the PCH must be drawn with caution. Movements, density, and traditions of the PCH differ from those of the CAH (Chapter II). Because of the greater density of PCH on their calving grounds, the PCH would interact with oil development much more extensively and intensively than the CAH has interacted with oil development in the Prudhoe Bay area.

Caribou calving in the Prudhoe Bay area was reported by Gavin (1971), Child (1973), and White and others (1975), when development of the Prudhoe Bay oil field was beginning. Later studies (Cameron and Whitten, 1979, 1980; Cameron and others, 1981; Whitten and Cameron, 1985) indicate an absence of calving near the coast at Prudhoe Bay during 1976-85, possibly due to avoidance of the activity area by calving caribou. Two centers of concentrated calving activity were identified: (1) west of Prudhoe Bay in the vicinity of the Kuparuk and Ugnuravik Rivers (including recent oil development in the Milne Point and Kuparuk areas); (2) east of Prudhoe Bay, primarily in the Bullen Point to Canning River delta area (Shideler, 1986). Surveys in 1981 indicate that the Canning River delta area may support more calving caribou than the Kuparuk area (Whitten and Cameron, 1985). Table VI-4 compares calving in the Prudhoe Bay area and population of the CAH with development of the Prudhoe Bay oil field. The apparent herd increase has been attributed to high calf production and survival as well as relatively light hunting pressure (Whitten and Cameron, 1983).

Even more tenuous are parallels between caribou activities and population trends on NPRA with those which might result from oil development on the 1002 area. Although NPRA has been extensively explored, no oil production or infrastructure development has occurred.

Approximately 242,000 acres of the 1002 area used as a core calving area by the PCH has been determined Resource Category 1 habitat in accordance with the FWS mitigation policy. More than 50 caribou/sq mi have been present during calving in at least 5 of 14 years (1972-85) for which detailed data exist (pl. 2A); nearly 80 percent of the total core calving area for the 180,000 member PCH occurs in this portion of the 1002 area (table VI-5). The remaining approximately 1,304,000 acres, considered Resource Category 2 habitat, includes areas used year-round by up to 4,000 CAH caribou and for concentrated and scattered calving, postcalving aggregations, and insect-relief habitat by the PCH.

If the 1002 area's anticipated oil and gas resources were developed across the entire area, direct modification of caribou habitat could total approximately 5,650 acres. East of the Sadlerochit River about 3,650 acres used by the PCH, of which about 1,300 acres are Resource Category 1 habitat, would be affected. West of the Sadlerochit River some 2,000 acres, predominantly used by the CAH, would be affected. Slightly more than 0.3 percent of all Resource Category 2 habitat would be directly modified. Most of the reduction in habitat value would result from covering feeding and calving habitat with gravel.

Table VI-4.--Central Arctic caribou herd population, calving in Prudhoe Bay area, and Prudhoe Bay development activities, 1969-85.

[Information from Shideler (1986); some variation exists in calving areas surveyed. Long-term investigations of the CAH begun in 1974 by ADF&G. N.A., not available]

Year	Total CAH population	Number cows and calves	Development activities
1969-70	([1])	([1])	Oil discovered.
1972	N.A.	13	Deadhorse airport, road system, several drill pads developed.
1973	N.A.	42	
1974	N.A.	51	Construction of TAPS: rapid area growth in roads, facilities, and drill pads.
1976	N.A.	([2])	Oil production begins.
1978	6,000	([3])	Drill sites and road connecting Kuparuk with Prudhoe Bay developed.
1981	9,000	N.A.	Kuparuk pipeline connecting to TAPS completed.
1983	N.A.	0	Expansion of Kuparuk oil field.
1985	12,000-14,000	N.A.	Pipeline to Milne Point constructed.

[1] Reports of area used for calving by the 3,000 or so caribou residing in Prudhoe Bay area, early 1970's.

[2] A handful.

[3] About 10.

Because insects are easily blown off somewhat elevated, unvegetated areas by wind, some positive effect might occur in the form of increased insect-relief habitat (Curatolo and others, 1982; Elison and others, 1986). However, it is generally during the oestrid fly (nose bot and warble flies) harassment period from late July to early

Table VI-5.--Porcupine caribou herd calving area potentially affected by development under full leasing or limited leasing, assuming an approximately 2-mile sphere of influence

	Concentrated calving area[1]	Core calving area[2]
Total calving area within 1002 area (acres)	934,000	242,000
Area (acres) potentially influenced by development:		
Full leasing	357,000	78,000
Limited leasing	261,000	10,000
Percent of 1002 calving area potentially influenced by development:		
Full leasing	38	32
Limited leasing	28	4
Total calving area (acres) in U.S. and Canada	2,117,000	311,000
Percent of total U.S. and Canada area potentially influenced by development:		
Full leasing	17	25
Limited leasing	12	3

[1] At least 50 caribou/square mile during calving, in 1-4 years, 1972-85.

[2] At least 50 caribou/square mile during calving for at least 5 years, 1972-85.

August that caribou seek relief on unvegetated gravel roads, well pads, or the shade of pipelines and buildings on those pads (Curatolo, 1983; Fancy, 1983). Insect harassment of PCH on the 1002 area generally results from swarms of mosquitoes early in the summer season. The PCH usually leaves the 1002 area prior to the emergence of oestrid flies.

Secondary modification of habitat due to changes in surface water flow, snow accumulation, roadside dust deposition, gravel spray from vehicle movements, and pollution incidents would reduce the habitat value of additional acreage. These changes in vegetation, and thus food availability, could occur on approximately 7,000 acres, of which nearly 1,800 acres is in Resource Category 1 (1 percent). Total modification of caribou habitat attributable to direct and secondary changes would occur on about 12,650 acres, or 0.8 percent of the 1002 area, and 1.3 percent of the core calving area (Resource Category 1 habitat).

Major indirect losses of habitat and additional reductions in habitat value would be widespread throughout the 1002 area. The habitat value losses from these indirect effects would result from behavioral avoidance of development areas; decreased accessibility to undeveloped areas (insect-relief habitats along the coast) due to physical barriers and disturbances such as pipelines, traffic, or facilities; and other disturbances or harassment by oil development activities and personnel during sensitive caribou life stages.

Disturbance to caribou is unavoidable if oil development occurs on the 1002 area. Historically the entire area has been used by PCH caribou at varying levels of intensity. Disturbance can result from a variety of sources including presence of pipelines and roads, aircraft operations, general construction, routine operation of the oil field, presence of people, and hunting. Reactions depend upon several factors, including caribou age and sex, herd size, presence of calves, season, and type and distance of the disturbance.

Behavioral avoidance of development areas displaces caribou from preferred habitats of traditional use. It is generally believed to result from human activity (noise, vehicle movements, presence of people, and odors), instead of the mere presence of roads, pipelines, and buildings. Avoidance of oil development and other human activity by caribou has been reported by numerous investigators (Dau and Cameron, 1985; Cameron and others, 1979; Whitten and Cameron, 1983; Fancy and others, 1981; Urquhart, 1973; Wright and Fancy, 1980). The reported extent of displacement varies. Displacement of the CAH from historic calving grounds in response to oil development at Prudhoe Bay has been documented (Dau and Cameron, 1985; Cameron and Whitten, 1979). Whitten and Cameron (1985) found consistently low numbers of caribou and generally low percentages of calves in the Prudhoe Bay oil field from their annual surveys of the CAH calving grounds, 1978-82, with caribou being displaced to adjacent areas already used for calving. Mean densities of caribou in five other regions of the calving grounds were 2 to 18 times higher than at Prudhoe Bay. Dau and Cameron (1985), in what may be the most systematic study of caribou displacement by oil development, reported that maternal caribou groups showed measurable declines in habitat use within approximately 2 miles on either side of the Milne Point road in the central Alaskan arctic.

Caribou select calving areas because of favorable weather causing early snowmelt, advanced emergence of new vegetation, relative absence of predators, proximity to insect-relief habitat, absence of disturbance, or some combination of these and other factors. Maternal cows and their calves are most sensitive to disturbance during calving and immediately thereafter (Calef and others, 1976; Miller and Gunn, 1979; Elison and others, 1986).

Displacement of the PCH from a core calving area to a less desirable area would be expected to reduce caribou productivity. Loss of important habitat has been shown to directly impact ungulate populations (Wolfe, 1978; Skovlin, 1982). But no recognizable, long-term effect upon the CAH as a result of displacement by oil development in the central Alaskan Arctic has been demonstrated to date. In considering the effects of displacement of the CAH from traditional calving grounds, Whitten and Cameron (1985) contend that the CAH has not experienced a reduction in productivity or consequent population decline because: (1) the CAH has been displaced from only part of its calving grounds; (2) suitable alternative high-quality habitat appears available for caribou displaced from Prudhoe Bay; and (3) overall density of CAH caribou on their calving grounds is much lower than that of other arctic herds in Alaska. Although the CAH and PCH calving grounds are roughly equal in size and the Western Arctic herd calving ground is about 50 percent larger, the population of the PCH is about 15 times larger and that of the Western Arctic herd is about 18 times larger than the CAH (based on 1982 population estimates).

Both absolute (number of caribou, including calves, on the calving grounds divided by area of calving grounds) and effective (allowing for the length of time a herd uses its calving grounds each year) densities of the CAH are a fraction of PCH and Western Arctic herd calving ground densities. As described by Whitten and Cameron (1985), absolute density for the PCH is nearly 14 times, and for the Western Arctic herd nearly 15 times greater than for the CAH. The difference in effective densities is even greater, particularly for the PCH, which are found at approximately 24 caribou per square kilometer as compared with approximately 5 caribou per square kilometer for the CAH. Effective density of the Western Arctic herd is 15 caribou per square kilometer.

With the CAH calving density remaining low compared to other herds, despite a recent population increase, overcrowding and consequent habitat stress that might result in reduced productivity have not yet occurred, nor have caribou been displaced to areas of reduced habitat value or areas where they might be exposed to increased predation. Unlike the Western Arctic or Porcupine caribou herds, the CAH has been exposed to minimal predation in recent years. With the influx of workers and use of the haul road for Prudhoe Bay development, the wolf population in the Central Arctic area decreased in the mid-1970's because of hunting. At that time CAH numbers began increasing. The wolf population has remained low and brown bears, which also prey on caribou, are only moderately abundant in the area.

The lack of observable adverse effects from displacement exhibited by the CAH would be unlikely for the PCH. The PCH is much more crowded in its calving habitats, and a substantially greater proportion of important calving habitats would be involved with development that included their core calving area. Furthermore, predators are more abundant adjacent to their core and concentrated calving areas. For example, preliminary analysis of radio-relocation data indicate that brown bears shift habitat use patterns to coastal areas in June and early July (pl. 1D) to coincide with occupancy of those habitats by calving and postcalving caribou (Garner and others, 1985).

Biologists participating in the FWS workshop all agreed that displacement from areas of human activity related to oil and gas activities would occur (Elison and others, 1986).

Plates 2A and 2B show the substantial overlap of potential oil development facilities with PCH calving areas and smaller overlap of such areas with CAH calving areas. Calving caribou of the PCH and those CAH caribou using the 1002 area are the most sensitive segment of those herds. They would annually encounter oil development during one of the most, if not the most critical time in their yearly cycle. Based upon the work of Dau and Cameron (1985), caribou are displaced approximately 2 miles out from development. This is most applicable during calving and immediately postcalving, which coincides with the greatest caribou use of the 1002 area. Within this approximately 2-mile area of influence are about 357,000 acres (38 percent) of the total concentrated calving grounds in the 1002 area.

For this analysis, core calving areas for the PCH are defined as concentrated calving areas used by at least 50 caribou/sq mi in 5 or more of the last 14 years (Chapter II and pl. 2A). Development in these areas is of particular concern. Seventy-eight percent of the PCH's core calving areas is within the 1002 area and is designated as Resource Category 1 habitat. An approximately 2-mile displacement of caribou out from petroleum facilities would include loss of 32 percent of the most critical PCH core calving areas (table VI-5). The mitigation goal for Resource Category 1 habitat is no loss of existing habitat value. The projected displacement from preferred calving habitat would represent a complete loss of habitat values. Measuring the probable population decline from complete loss of habitat values in calving areas is impossible and the ultimate effects of displacement are unknown.

Barriers to caribou movements are another source of indirect habitat loss. Roads without activity generally present little problem to free movement of caribou. Depending upon design pipelines may create a barrier, those adjacent to or close to active roadways would probably most impede free movement (Elison and others, 1986). Several investigators have described where passage of caribou through oil or other development areas has been inhibited because of linear oil-development facilities and associated activities (Curatolo and others, 1982; Smith and Cameron, 1985a, b; Klein, 1980). This is of particular concern in the 1002 area because the probable pipeline/haul road route would bisect the area.

Barriers to caribou movements could result in decreased calving success by reducing access to preferred calving areas, compounding the displacement from calving areas which could result from disturbance as discussed previously. A greater concern, relative to the location of potential barriers under the full leasing scenario, would be inhibiting movements for the large postcalving aggregations which annually occur on the 1002 area as they move between inland feeding areas and coastal insect-relief habitats. In years when ice breakup is late and more of the PCH calving occurs east and southeast of the 1002 area, there is a strong westward movement following calving. Virtually the entire PCH gathers on the 1002 area for foraging and insect relief, with large portions of the herd tending to remain on the 1002 area later into July and August during the years of late breakup (Roseneau and Stern, 1974; U.S. Fish and Wildlife Service, 1982; U.S. Fish and Wildlife Service, unpublished data). The insect season is a period of extreme natural harassment and one of the primary driving forces in the annual caribou cycle. This harassment follows closely behind the critical calving period. Insect harassment can have a pronounced negative effect on caribou survival. Helle and Tarvainen (1984) reported that insect harassment reduced growth in reindeer calves in Finland and contributed heavily to increased mortality the following winter. Insect harassment also affected the body size at maturity. Insect harassment and the avoidance actions of caribou put considerable energy stress on caribou (Reimers, 1980; White, 1983). Davis and Valkenburg (1979) reported several dead and sick calves in the Western Arctic caribou herd, all with heavy infestations of nose bot larvae. Reduced access to insect-relief habitat would result in greater energy stress with possibly reduced survival.

Numerous investigators have reported on the varying successes of caribou in crossing roads and pipelines associated with Prudhoe Bay facilities (Fancy, 1982, 1983; Curatolo, 1984; Curatolo and Murphy, 1983; Smith and Cameron, 1985a, b). Crossing success depends on several factors including traffic and human activity levels, pipeline design, season, and type and amount of insect harassment. Caribou crossing success is generally greatest at buried pipelines and then decreases for roads without traffic, to elevated (at least 5 feet above ground) pipelines adjacent to roads without traffic, to pipelines adjacent to roads with traffic. Large mosquito-harassed groups do not readily cross beneath elevated pipelines (Curatolo and Murphy, 1983; Smith and Cameron, 1985b); deflections of up to 20 miles during which caribou trotted or ran have been observed in the central Alaskan Arctic. During the oestrid fly season, caribou crossing success was markedly increased. In summarizing their 1981-83 studies of caribou crossings at roads and pipelines in the Prudhoe Bay and Kuparuk oil fields, Curatolo and Murphy (in press) attributed the lower crossing frequencies at pipeline/road sites to the combined stimulus of vehicular traffic and a pipeline.

After evaluating caribou responses to pipelines, roads, and pipeline/road complexes in the Kuparuk oil field, Curatolo and Murphy (1983) suggested that caribou movements could be facilitated by separating pipelines from heavily traveled roads and constructing ramps at strategic locations over elevated pipelines. Other researchers have concurred that roads should be separated from pipelines as a means of improving caribou passage through development areas (Curatolo and others, 1982; Robus and Curatolo, 1983; Elison and others, 1986). The optimum separation between roads and pipelines depends upon terrain; preliminary information indicates that a separation of at least 400-800 feet improves caribou crossing success (Curatolo and Reges, 1986).

Where Curatolo and Murphy (1983) and Smith and Cameron (1985a, b) documented reduced crossing success in areas of oil-related development, it has been for caribou exposed to major oil and gas development for extended periods annually in the central Alaskan Arctic since the early 1970's. Because some habituation would presumably have occurred, animals in the CAH may be more likely to cross an oil-field development than the PCH which would encounter such developments for only 2 or 3 months each year.

Eighteen percent (294,000 acres) of the 1002 area, including KIC/ASRC lands, used for insect-relief and other purposes by the PCH lie north of the proposed pipeline/road corridor. Use of this area by the PCH could be affected by two possible factors. If caribou refuse to cross through any development areas, then 294,000 acres would be unavailable as habitat. That area encompasses 52 percent of total insect-relief habitats and over 80 percent of coastal insect-relief habitats. This would mean that all coastal insect-relief habitats within the 1002 area, except for a small area in the eastern portion, would become unavailable under full development. The second factor is to assume the approximately 2-mile sphere of influence for oil development used previously. Under that assumption, caribou crossing through the development area would avoid using approximately 72,000 acres or 29 percent of identified coastal insect-relief habitat within the 1002 area and KIC/ASRC lands (Pank and others, 1986). Failure to obtain relief from insect harassment from either factor could shorten foraging time, leading to poorer physical condition and subsequently to increased susceptibility to predation and reduced overwinter survival.

Notwithstanding the limited sample size and timeframe covered, the satellite telemetry work of Pank and others (1986) provides an indication of the extent to which 1002 area caribou could interact with facilities and infrastructure necessary for full leasing. Their preliminary analysis of the potential interaction between PCH and CAH caribou and the oil development scenario used in this report involved 10 caribou radio-collared on winter range in the Arctic Refuge, two from the CAH and eight from the PCH. An interaction was defined as whenever a caribou point location, or any segment of a line connecting two point locations calculated for the same caribou on adjacent days, was within approximately 2 miles of a road, pipeline, drill pad, airfield, or other development facility. Point locations for the five caribou from the PCH which entered the 1002 area in summer 1985 can be examined to indicate the extent of time caribou usually spend within the development area. Of the 232 point locations, 51 (22 percent of the time) were within approximately 2 miles of the infrastructure for full development. Moreover, 34 percent of caribou routes between locations on adjacent days were also within the approximately 2-mile area influenced by development. The two CAH caribou encountered the development scenario to a much greater extent than did the collared PCH caribou: 413 (32.7 percent) of 1264 point locations and 83 percent of routes were within the approximately 2-mile interaction area.

Effects of disturbance might also include injury by trampling during stampedes, particularly calves; energy stress, possibly critical during times of low energy reserves such as winter and postcalving; and inability to reach insect-relief habitat which also increases energy loss. Miller and Gunn (1979) and Northwest Territories Wildlife Service (1979) noted that major physiological responses to harassment may occur in the absence of visible behavioral changes.

Aircraft activities are another cause of disturbance; numerous instances involving caribou have been documented. For example, Calef and others (1976) reported that helicopters which hazed caribou from the rear caused the most severe panic reaction. Large herds of up to 60,000 animals could be herded by flying at altitudes of up to 2,000 feet above ground level (AGL). Calves were more sensitive than other age classes and caribou on calving grounds were most reactive.

Recommendations for aircraft restrictions differ. According to Calef and others (1976), flight elevations of 500 feet AGL would prevent most injurious caribou reactions and altitudes of 1,000 feet AGL would avoid mild escape responses. These investigators recommended that aircraft maintain altitudes of 1,000 feet AGL during caribou calving, caribou rut, and early winter. Davis and Valkenburg (1979) also noted an inverse relationship between the altitude of aircraft and severity of the caribou's reaction. They recommended altitudes of 2,000 feet AGL from May to August. The Peary caribou herd in Canada reacted similarly to helicopters (Miller and Gunn, 1979); altitudes of 2,000 feet AGL were recommended for May to November and 1,000 feet AGL at other times.

Davis and Valkenburg (1979) reported that caribou may respond more to people on the ground than to flying aircraft. They recommend that people and vehicles maintain a minimum distance of 3,000 feet from caribou during calving. Curatolo and others (1982), Miller and Gunn (1979), and Elison and others (1986) have all reported that traffic, people, or general activity is more disturbing to caribou than merely the presence of roads or structures. No agreement on effects, and sometimes even causes, of disturbance exists. For example, Bergerud and others (1984) have a dissenting, though widely disputed, view. For review of the effects of various human developments on the demographics of seven North American caribou herds and one wild Norwegian reindeer herd, they postulated that caribou can withstand periodic severe disturbance without adverse effects on productivity and survival. They discounted the effects of much of the disturbance associated with development activities, concluding instead that increased hunting along transportation corridors through several herd ranges was responsible for distributional changes.

One of the more significant effects on caribou as a result of better human access to their habitats has been increased harvest (Bergerud and others, 1984). Obviously, hunting directly reduces the number of caribou in a population. More important, it reinforces the negative stimulus in surviving animals to associate human activity and development with danger. This negative stimulus increases the intensity and duration of disturbance and displacement. It also reduces habituation which, over time, could otherwise offset some displacement. Habituation of caribou to structures and activity occurs more readily in unhunted than hunted populations (Klein, 1980).

Legal harvest outside developed areas would be expected to increase moderately as workers could conveniently travel to adjacent areas to hunt caribou in season. The State of Alaska as lead, in cooperation with the FWS, sets seasons and bag limits for the 1002 area. Closing the oil development area to hunters should reduce illegal take to a minor level. Still, law enforcement in such a remote area is often difficult. For example, notwithstanding the fact that a 5-mile corridor along either side of the Dalton Highway from the Yukon River north to Prudhoe Bay, the gravel TAPS haul road, has been closed to firearms since 1975, State Fish and Wildlife Protection Officers and Alaska Department of Fish and Game (ADF&G) biologists are discovering increasing numbers of people hunting illegally within the corridor and outside the corridor through illegal access using all-terrain vehicles. The ADF&G has been monitoring the kill; their biologists estimate that as many as 800 caribou were taken in Game Management Unit 26B (Central Arctic) during fall and winter 1985-1986. All but 82 came from along the approximately 200 miles of the haul road between Prudhoe Bay and Atigun Pass (K.R. Whitten, ADF&G, unpublished data). The majority of this harvest is illegal because hunters either lacked a road permit where necessary or illegally used all-terrain vehicles for access. While the prohibition on discharging firearms extends to all users, including subsistence users, subsistence take is not considered a significant factor in the total harvest because of the distance of subsistence users from this area. State protection officers have found it difficult to assign staff to such remote areas to enforce existing laws and regulations.

Based upon experience with TAPS and Prudhoe Bay, mortality as a result of vehicle collisions, entanglement and other accidents should be minor (R.D. Cameron and K.R. Whitten, unpublished data).

Mitigation

The following measures would help avoid and minimize habitat value losses in the 1,304,000 acres of Resource Category 2 caribou habitat. Mitigation of the loss of caribou habitat in Resource Category 1 (242,000 acres of core calving area) is not possible.

For exploration activities, all environmental protection measures required during the previous 1002 coastal plain exploration program (50 CFR 37.31) and the drilling of an exploration well on KIC/ASRC lands (August 9, 1983, Agreement between Arctic Slope Regional Corporation and the United States of America, Appendix 2, Land Use Stipulations) will maintain most habitat values. Oil exploration, with the exception of surface geology studies, should be limited to the period of winter conditions, generally November 1 to May 1.

For oil development, the success of various stipulations designed as mitigation will ultimately determine the degree to which oil development actually affects caribou using the 1002 area. Measures previously used with success for Arctic oil development as well as other measures which should further help to reduce negative effects on caribou include:

1. Bury all pipelines where possible (Cameron and Whitten, 1979; Elison and others, 1986). Because of permafrost, opportunities for pipeline burial will be few. Where burial is not feasible:

    A. Place ramps over structures in areas of natural crossings or where development tends to funnel caribou (Curatolo and Murphy, 1983; Robus and Curatolo, 1983; Elison and others, 1986).

    B. Elevate pipelines (the most common practice) to allow free passage of caribou in areas without ramps (Elison and others, 1986).

2. Reduce disturbance from vehicle activity by limiting use of development infrastructure to essential industry and agency personnel on official business (Elison and others, 1986).

3. Close the area within 5 miles of all development and associated infrastructure to hunting and trapping, as well as to discharge of firearms, so as to reduce disturbance to caribou and to protect people and equipment (Elison and others, 1986; Carruthers and others, 1984).

4. Site nonessential facilities outside calving areas and major movement zones (Cameron and Whitten, 1979; Elison and others, 1986).

5. Separate roads and pipelines as necessary in areas used for crossing to improve crossing success (Curatolo and Murphy, 1983; Curatolo and others, 1982; Robus and Curatolo, 1983; Elison and others, 1986; Curatolo and Reges, 1986).

6. Acquire authority to establish time and area closures or restrictions on surface activity to minimize disturbances during calving or in concentrated use areas (Cameron and Whitten, 1979; Curatolo and others, 1982; Robus and Curatolo, 1983).

7. Establish time and area closures and minimum altitude restrictions for aircraft operations of 1000 feet AGL (Aug. 16 through May 19) and 2000 feet AGL (May 20 through Aug. 15). Altitude and time restrictions may be modified after further study.

8. Monitor the effects of oil development on caribou.

9. Annually monitor herd size, productivity, movements, distribution, and general health. If greater or additional adverse effects are found to occur than those initially predicted, additional mitigation or protective management actions would be implemented upon the recommendation of the FWS, in conjunction with the State where effects extend beyond the boundaries of the 1002 area. Additional mitigation could include further seasonal area closures, surface or air traffic restrictions, phasing of field development, or state-of-the-art measures.

10. Protect insect-relief habitat and facilitate free movement and access for caribou by reducing surface occupancy in the zone from the coast to 3 miles inland (Elison and others, 1986). Occupancy would be restricted to marine facilities and infrastructure necessary to move inland beyond the restricted zone.

11. Protect riparian and adjacent areas by placing permanent production facilities outside the areas within 3/4 mile of the high-water mark on both sides of identified watercourses (pl. 2A) and by limiting crossings of transportation facilities.

Conclusion

Surface geologic exploration and study conducted throughout the year would be controlled by specific time and area closures to avoid conflicts with caribou calving and movements during the insect-relief period. Seismic activity would be confined to winter work only. Based upon experience from the 1983-1985 exploration program in the 1002 area, only negligible effects would occur. Localized avoidance and disturbance of a minor nature may occur in the area of exploration wells if caribou entered the area while well drilling activities were underway. Because human activity would be low, effects would most likely result from some avoidance and displacement around well pads.

The expanding population trend for the CAH in the past decade would indicate that the CAH is not at carrying capacity (the number of healthy animals that can be maintained by habitat on a given unit of land). However, the point at which cumulative effects and expanding developments all modify suitable displacement habitat is unknown. Also unknown is carrying capacity of the PCH. Given the geography of the calving areas and current densities in those areas, the availability of suitable alternative habitats is not apparent.

A major change in distribution as an adverse result of displacement of both that portion of the CAH using the 1002 area as well as the entire PCH could occur if the 1002 area were fully developed. The main oil pipeline would bisect the 1002 area between the western and northeastern boundaries. Disturbance would occur from the presence and activities of up to 6,000 people, hundreds of vehicles, and major construction and production activities scattered throughout the 1002 area, including sensitive caribou calving areas. Use of approximately 25 percent of the total PCH core calving area and 29 percent of the coastal insect-relief habitat could be reduced or eliminated. Potentially a much larger portion, nearly 80 percent of coastal insect-relief habitat, could be affected if development proves to be a barrier to caribou movements. Loss of calving habitat, barriers to free movement causing reduced access to insect-relief and other areas, disturbance, stress, and other factors would cumulatively reduce both available habitat and habitat values on remaining areas, resulting in caribou population declines.

These changes in habitat availability and value, combined with increased harvest, could result in a major population decline and change in distribution of 20-40 percent, based on the amount of calving and insect-relief habitats to be adversely affected. Because of the many variables involved and lack of relevant experience in estimating impacts on this herd and because of the difficulty in quantifying impacts, this estimate is uncertain.

For the CAH, a moderate change in distribution or decline in that portion of the CAH using the 1002 area could occur. The effect on the entire CAH population throughout its range may also be moderate. Those effects on the segment of the CAH within the 1002 area would be similar to those on the PCH that occur from disturbance, displacement and barriers to free movement. The population decline or distribution change would be 5-10 percent for the CAH throughout its range.

MUSKOXEN

Recently reintroduced to the Arctic Refuge, muskoxen are rapidly expanding and pioneering new areas. From the 69 muskoxen introduced between 1969 and 1970 the population has grown to 476 in 1985. Carrying capacity has apparently not been reached.

Experience in the Arctic Refuge from winter seismic exploration in 1984 and 1985 and summer surface exploration in 1983, 1984, and 1985, indicates that these activities have only minor disturbance effects upon Arctic Refuge muskoxen. Harassment may result in a net energy drain if it occurs during the critical winter period, and can thereby reduce survival. Reynolds and LaPlant (1985) reported no long-term or widespread changes in distribution or use of traditional areas in response to disturbance by seismic exploration. In response to seismic activity, one herd did move 2.8 miles and another herd moved 1.9 miles within 24 hours. Jinglors and Lassen (1984) found that muskox disturbed by seismic vehicles either ran or gradually moved away. Other investigators (Carruthers, 1976; Russell, 1977) reported similar responses by muskoxen from winter seismic exploration in Canada.

Potentially economic prospects in blocks A, C, and D occur partially in year-round high-use areas, including calving areas (pl. 2C). Direct loss of muskoxen habitat from oil development could total approximately 2,700 acres.

Disturbance caused by routine oil field operation and associated infrastructure may exclude or reduce muskoxen use of preferred habitat. Muskox reaction to helicopters depends on sex and age of animals, group size, number of calves in a group, the position of the sun and wind direction relative to the disturbance, what the animals are doing at the time of disturbance, and terrain (Miller and Gunn, 1979). In their extensive study of the reaction to helicopter disturbance of muskoxen on Banks Islands, Northwest Territories, Canada, Miller and Gunn (1979) reported that: cows and calves and solitary bulls were the most responsive to disturbance; the reaction of muskoxen to disturbance was similar to their response to a predator; and the degree of reaction to disturbance was generally inversely related to the distance of the disturbing stimuli. The presence of people on the ground in association with helicopters that had landed increased the disturbance. Although muskoxen disturbed by helicopters usually moved less than 0.2 mile, Miller and Gunn (1979) recommended minimum altitudes of 2,000 feet AGL during May-November and 1,000 feet AGL during December-April.

Muskoxen may also be disturbed by seismic surveys. One herd was reported to have run at least 0.6 mile after being disturbed by seismic vehicles 1.9 miles away (Reynolds and LaPlant, 1985). Temporary displacement of up to 2 miles has been observed on both sides of seismic lines (Russell, 1977). While oil field development and operation would be much more intrusive and sustained than seismic exploration, the increased disturbance may be

LY REFER TO:

United States Department of the Interior
FISH AND WILDLIFE SERVICE
ARCTIC NATIONAL WILDLIFE REFUGE
FEDERAL BUILDING & COURTHOUSE
101 12th AVENUE, BOX 20
FAIRBANKS, ALASKA 99701 – 6267

May 19, 1987

Mark Fraker
Standard Alaska Production Company
900 E. Benson Blvd.
Anchorage, Alaska 99519-6612

Dear Mark:

Enclosed are data regarding the distribution of radio-collared adult female of the Porcupine caribou herd during calving for the years 1983, 1984, and 1985. The assumptions and calculations which were used to estimate caribou densities are also included. References for 1983 and 1984 are the baseline update report series which you have a copy of. The 1985 update reports are in the final stages of preparation.

In general the data indicate higher densities of caribou in the designated concentration areas. The Alaskan concentration constituted the bulk of the calving populations and contributed most of the productivity that occurred during these years. The Alaskan calving areas are used most frequently by most of the calving caribou.

Because the 1985 data have not been fully reported, and we have not completed our analysis of the multi-year data, we suggest that these data be considered as preliminary.

If you have any further questions regarding these data or interpretations of it, please contact us.

Sincerely,

Glenn W. Elison
Refuge Manager

cc: Larry Pank, Alaska Fish & Wildlife Office of Research
Ken Whitten, Alaska Department of Fish and Game

FJM:krd/6246A

Estimated Number and Density of Caribou on the Calving Grounds of the Porcupine caribou herd, 1983- 1985[1].

1983

Location	Adult Females	Calves	yearlings	Total Caribou	Density (caribou/mi^2)
Jago	14175	11340	1080	26595	32.7
Kongakut	14175	11340	1080	26595	78.3
Subtotal (Conc. Areas)	28350	22680	2160	53190	
Peripheral	18426	14742	3240	36408	18.9
Total	46776	37422	5400	89598	

1984

Location	Adult Females	Calves	yearlings	Total Caribou	Density (caribou/mi^2)
Niguanak	9908	7926	775	18609	98
Aichilik	11994	9596	775	22365	81
Stokes Pt.	5215	4172	775	10162	54
Subtotal (Conc. Areas)	27117	21694	2325	51136	
Peripheral	25032	20025	3576	48633	8.8
Total	52153	41723	5901	99777	

1985

Location	Adult Females	Calves	yearlings	Total Caribou	Density (caribou/mi^2)
Jago	32340	25872	1320	59532	65
Stokes Pt.	8663	6930	1320	16913	69
Subtotal (Conc. Areas)	41003	32802	2640	76775	
Peripheral	16748	13398	3960	34106	16.3
Total	57751	46200	6600	110881	

[1] Numbers and densities are estimated according to the proportion of radio-collared adult female caribou found in calving grounds location during the calving season (Appendix I and II). Areas of calving concentrations and peripheral areas were derived from digitized maps (1:250,000 scale).

APPENDIX I

Assumptions:

1. The distribution of radio-collared adult female caribou are representative of that segment of the herd at the time of calving.
2. The population of the Porcupine caribou herd was 135,000, 149,000 and 165,000 in 1983, 1984 and 1985 respectively (Whitten 1987).
3. Adult females (3+ years old) make up 35% of the total population (Whitten and Cameron 1981).
4. The natality rate is 80% (Bergerud 1980).
5. Yearlings make up approximately 12% of the total Porcupine caribou herd population (Whitten and Cameron 1981).
6. One-third of the yearlings occur on the calving grounds at calving time and up to 60% of these occur in peripheral areas with the remainder in concentration areas (Whitten et al. 1984 and field observations).

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APPENDIX II

Calculations:

1983

1) 135,000 (1983 total population) x .35 (proportion of adult females) = 47,250 = total adult females on the calving grounds.

2) 47,250 x .8(natality rate) = 37,800 = total calves born

3) 135,000 x .04 (proportion of yearlings) on the calving grounds = 5,400 = total yearlings on the calving ground.

7/23 (30%) of r-collared adult females occurred within the Jago concentration
7/23 (30%) of r-collared adult females occurred within the Kongakut concentration
9/23 (39%) of r-collared adult females occurred within the remaining peripheral areas

Total caribou within the Jago concentration:
.30 x 47,250 = 14,175 adult females
.8 x 14,175 = 11,340 calves
.2 x 5,400 = 1080 yearlings
26,595 Total caribou

Area of the Jago concentration = 2108km^2
Density = 26,595 caribou/2108 km^2 = 12.6 caribou/km^2 or 32.7 caribou/mi^2

Total caribou within the Kongakut concentration:

.30 x 47,250 = 14,175 adult females
.8 x 14,175 = 11,340 calves
.2 x 5,400 = 1,080 yearlings
26,595 Total caribou

Area of the Kongakut concentration: 880 km^2
Density = 26,595 caribou/880 km^2 = 30.2 caribou/km^2 or 78.3 caribou/mi^2

Total caribou within peripheral areas:
.39 x 47,250 = 18,426 adult females
.8 x 18,426 = 14,742 calves
.6 x 5,400 = 3,240 yearlings
36,408 Total caribou

Area of peripheral area: 4999 km^2
Density = 36,408 caribou/4999 km^2 = 7.2 caribou /km^2 or 18.7 caribou/mi^2

1984

149,000 (Total 1984 population) X .35 = 52150 adult females on calving grounds
52,160 x .8 (natality rate) = 41728 total calves born
149,000 x .04 = 5960 total yearlings on the calving ground

6/31 (19%) of radio-collared adult females occurred within the Niguanak Concentration

7/31 (23%) of radio-collared adult females occurred within the Niguanak Concentration Aichilik Concentration
3/31 (10%) of radio-collared adult females occurred within the Niguanak Concentration Stokes Pt. Concentration
15/31 (48%) of radio-collared adult females occurred within the Niguanak Concentration peripheral areas

Total caribou within the Niguanak Concentration:
.19 x 52150 = 9908 adult females
.8 x 9908 = 7926 calves
.13 x 5960 = 775 yearlings
18,609 Total caribou

Area of the Niguanak area: 511 km^2
Density= 18609 caribou/511 km^2 = 36 caribou/km^2 or 98 caribou/mi^2

Total caribou within the Aichilik Concentration:

.23 x 52,150 = 11,994 adult females
.8 x 11,994 = 9,596 calves
.13 x 5,960 = 775 yearlings
22,365 Total caribou

Area of Aichilik Area = 746 km^2
Density = 22,365 caribou/746km^2 = 30 caribou/km^2 or 81 caribou/km^2

Total caribou within the Stokes Pt. Concentration:

.1 x 52,150 = 5215 adult females
.8 x 5,215 = 4172 calves
.13 x 5,960 = 775 yearlings
10,162 Total caribou

Area of Stokes Pt. Area = 508 km^2
Density = 10,162 caribou/508 km^2 = 20 caribou/km^2 or 54 caribou/mi^2

Total caribou within the Peripheral Areas:

.48 x 52,150 = 25,032 adult females
.8 x 25,032 = 20,025 calves
.6 x 5,960 = 3576 yearlings
48,633 Total caribou

Area of Peripheral Areas: 14,234 km^2
Density = 48,633 caribou/14,234 km^2 = 3.4 caribou/km^2 or 8.8 caribou/mi^2

1985

165,000 (Total 1985 population) x .35 = 57,750 adult females on calving grounds.

57750 x .8 (natality rate) = 46200 calves born
165,000 x .04 (yearlings) = 6600 yearlings on calving grounds

31/55 (56%) of radio-collared adult females occurred within the Jago Concentration.
8/55 (15%) of radio-collared adult females occurred within the Jago Concentration Stokes Point Conc.
16/55 (29%) of radio-collared adult females occurred within the Jago Concentration Peripheral area

Total caribou within the Jago Concentration:
.56 x 57750 = 32340 adult females
.8 x 32340 = 25872 calves
.2 x 6600 = 1320 yearlings
59532 Total caribou

Area of Jago Concentration = 2386 km^2
Density = 59532 caribou/2386 km^2 = 25 caribou/km^2 or 65 caribou/mi^2

Total caribou in Stokes Point Concentration:
.15 x 57750 = 8663 adult females
.8 x 8663 = 6930 calves
.20 x 6600 = 1320 yearling
16913 Total caribou

Area of the Stokes Pt. Concentration = 634 km^2
Density = 16913 caribou/634 km^2 = 27 caribou/km^2 or 69 caribou/mi^2

Total caribou in the Peripheral Area:
.29 x 57,750 = 16,748 adult females
.8 x 16,748 = 13,398 calves
.6 x 6,600 = 3,960 yearlings
34,106 Total caribou

Area of Peripheral Area = 5,412 km^2
Density = 34,106 caribou/5,412 km^2 = 6.3 caribou/km^2 or 16.3 caribou/mi^2

Location and Productivity of Radio-collared Adult Female Caribou on the Calving Grounds of the Porcupine caribou herd, 1983.

Location	Total R-collared Females Present	Parturient Females	Within Area Productivity (%)	Percent of Total Productivity
Jago Concentration Area	7	6	86	33.3
Kongakut Concentration Area	7	6	86	33.3
Subtotal (Concentrations)	14	12	86	66.6
Remaining (Peripheral Area)	9	6	66	33.3
Total	23	18	86	99.9
Inside 1002 Study Area	13	11	85	61
Outside 1002 Study Area	10	7	70	39
In Alaska	21	17	81	94
In Canada	2	1	50	06

Location and Productivity of Radio-collared Adult Female Caribou on the Calving Grounds of the Porcupine caribou herd, 1984.

Location	Total R-collared Females Present	Parturient Females	Within Area Productivity (%)	Percent of Total Productivity
Niguanak Concentration Area	6	6	100	26
Aichilik Concentration Area	7	7	100	30
Stokes Pt. Concentration Area	3	3	100	13
Subtotal (Concentrations)	16	16	100	70
Remaining (Peripheral Areas)	15	7	47	30
Total	31	23	74	100
Inside 1002 Study Area	9	9	100	39
Outside 1002 Study Area	22	14	64	61
In Alaska	20	18	90	78
In Canada	11	5	45	22

All radio-collared females of the Aichilik Concentration Area entered the 1002 study area during the period of 10-19 June thus, the post calving use of the 1002 study area is equivalent to the In Alaska data column.

Location and Productivity of Radio-collared Adult Female Caribou on the Calving Grounds of the Porcupine caribou herd, 1985.

Location	Total R-collared Females Present	Parturient Females	Within Area Productivity (%)	Percent of Total Productivity
Jago Concentration Area	31	25	81	69
Stokes Pt. Concentration Area	8	6	75	17
Subtotal (Concentrations)	39	31	79	86
Remaining (Peripheral Areas)	16	5	31	14
Total	55	36	65	100
Inside 1002 Study Area	27	22	81	61
Outside 1002 Study Area	28	14	50	39
In Alaska	37	30	81	83
In Canada	18	6	33	17

IMPACTS OF HUMAN DEVELOPMENTS AND LAND USE ON CARIBOU: A LITERATURE REVIEW

Volume II. Impacts of Oil and Gas Development on the Central Arctic Herd

by

Richard T. Shideler

Technical Report No. 86-3

Norman A. Cohen
Director
Habitat Division
Alaska Department of Fish and Game
P.O. Box 3-2000
Juneau, Alaska 99802

January 1986

EXECUTIVE SUMMARY

1. Although oil exploration on the North Slope has occurred since the 1920's large scale oil development did not begin until the Prudhoe Bay discovery in 1968. Since that discovery, oil development has spread westward into the Kuparuk oilfield, and is continuing with the development of the Milne Point field. Intensive exploration is occurring in the Colville River delta, and in several offshore locations east of Prudhoe Bay. In general the majority of the Central Arctic Caribou Herd (CAH) winter range is in the foothills and summer range (including concentrated calving areas) is on the coastal plain. Movements between these ranges are predominately north-south, whereas movements within the summer range are east-west along the coast and are dependent in part on the intensity of mosquito harassment. Oil development on the summer range could directly contact calving and coastal mosquito relief habitat, as well as affect movements to these habitats. Oil development in the foothills could directly contact CAH winter range, as well as affect movements between summer and winter range.

2. There is ample evidence to demonstrate that the term "herd" can be correctly applied to the CAH. Historic data suggested, and current data has confirmed, that the vast majority of caribou that are found on the CAH summer range belong to the CAH. Calving concentration areas near the coast and in proximity to Oliktok and Milne points, and Bullen Point to the Canning River delta, have been identified since the early 1970's. Although the overall density of calving on the coastal plain has varied from year to year, apparently due to weather and snow ablation during spring migration and early calving, these two areas have consistently been used by more parturient females than have other areas. Data from visual- and radio-collared animals indicate that there is strong fidelity of CAH cows to the CAH summer range and conversely few animals collared in adjacent herds have been re-located on the CAH summer range.

3. Two categories of habitat receive intensive use by CAH caribou—the sedge meadows comprising the calving concentration areas on the coastal plain, and coastal beaches, promontories, and river deltas that are used intensively as mosquito relief areas. The use of coastal sedge meadow habitat by calving caribou is contra-intuitive in that at calving time the availability and nutrient content of forage is greater in the foothills than on the coastal plain. Several hypotheses for the use of the coastal plain during calving have been advanced. These include the hypotheses that calving areas are located where predator densities are lower, or that calving areas are located in proximity to mosquito relief habitat; however, no single explanation for the apparent fidelity of parturient caribou to their calving ground appears to be justified. The potential significance to CAH caribou of continued access to coastal

mosquito relief habitat is discussed. These mosquito relief areas do not appear to provide adequate forage during mosquito harassment bouts, however they do provide habitat where caribou can avoid continual harassment and reduce the amount of energy expenditure that would be likely if such habitat were not available.

4. Our definition of impact is an effect on the ecosystem of caribou such that there has been a reduction in habitat quality, quantity, or the animal's ability to utilize that habitat that has been caused by oil or gas development. The emphasis on habitat-related effects as opposed to demographic effects (e.g., reduced population numbers, reduced calf recruitment) is due to the recognition that the effects of oil and gas development on caribou habitat and its utilization by caribou are spatially extensive and long-term (essentially irreversible). Impacts on CAH caribou that are caused by oil and gas activities on the North Slope include direct habitat loss; avoidance of developments; and disruption of movements. Potential impacts include harassment by aircraft and ground vehicles, and by pedestrians; and an increase in predation or human harvest.

5. The amount of habitat loss directly due to oil and gas development in the Prudhoe Bay, Kuparuk, and Milne Point oil fields was approximately 3,200 ha (8,000 ac) as of 1983. This is a conservative estimate because it includes only habitat covered by gravel or stripped for gravel mining, and does not include additional vegetation losses due to fugitive dust or ponding along roads and drill pads. However, direct habitat loss is an insignificant impact when compared to habitat that becomes unavailable to caribou because of their response to facilities and human activity that are associated with oil and gas development.

6. Harassment of caribou by aircraft can potentially cause injury or mortality to individuals (especially calves), disruption of the cow/calf social bond that could affect a young calf's ability to survive, and an increase in the amount of energy-consuming activities that a caribou engages in (e.g., from walking to running) or a decrease in feeding. Caribou in some herds appear to be sufficiently habituated to aircraft that they do not respond to overflights; caribou in other herds may react to a similar overflight with panicked running. Caribou in other herds appear to be most reactive to aircraft during calving and mosquito season. Overflights of higher than 660 m (2,000 ft) AGL during these sensitive periods, and 330 m (1,000 ft) at other times apper to cause little or no overt reaction. Harassment of caribou by off-road vehicles and pedestrians especially when herds are hunted, appears to cause a stronger reaction than most aircraft harassment; however, comparative observations in the CAH have not been made.

7. Caribou can react to linear developments (e.g., roads, pipelines) and point developments (e.g., drill pads) by avoiding areas around these developments. Avoidance has been measured by the distribution of caribou occupancy. The strength and longevity of the avoidance response by

caribou appear to vary depending on the composition of the caribou group, season of the year, type of development, amount of human activity associated with the development, species and degree of harassment by insect pests present, and the type of topography between the development and caribou as they approach a development.

8. Caribou of the CAH have been observed to avoid "point" developments such as an isolated, active drill rig during summer totally up to 1,200 m (4,000 ft) and partially up to 2 km (1.2 mi). Peary caribou have been observed to avoid an active seismic camp in winter by 2 km (1.2 mi) when the camp was located in flat terrain, but to approach similar camps which are located in hilly terrain.

9. Maternal groups of caribou in the CAH have been shown to avoid the TAPS corridor during all seasons, with the possible exception of the fall rutting period; the Prudhoe Bay oil field during summer; the Spine Road/Kuparuk Pipeline complex and the Milne Point Road during calving; areas of intensive human activity along the Spine Road during mid-summer; and the Milne Point Road during mid-summer. Maternal groups almost totally avoid the Prudhoe Bay oil field, and the area within 4 km (2.4 mi) of the Spine Road during calving. Maternal groups avoid linear developments during the remainder of the summer in direct (but not necessarily linear) proportion to the group's distance from the developments, up to a distance of a few kilometers.

10. Caribou summer movements through and within the oil fields have been reported from the viewpoint of broad scale movements within a subregion (e.g., within or around the Prudhoe Bay and Kuparuk oil fields), or from specific investigations of the behavior of caribou as they attempt to cross linear developments. Caribou movements into the Prudhoe Bay oilfield during mosquito harassment periods have virtually ceased, presumably due to the low clearance (often less than 1 m [3 ft]) of feeder lines and the intensity of human activity there. Caribou movements into and within the Kuparuk oil field have been disrupted by developments and human activity within the field; however, some of these disruptions may be short-term responses to localized areas of intensive human activity, and some return to pre-development patterns may be occurring.

11. The success of caribou in crossing linear developments appears to be dependent on several factors including size of the crossing group, type of development (e.g., isolated road, isolated pipeline, or road and pipeline in proximity), season of the year, type and density of insect pests, amount of human activity associated with the development, and presence of special features to enhance caribou crossing (e.g., ramps, buried sections, elevated pipe).

12. The rate of success by CAH of crossing linear developments varies according to the type of development. In order of decreasing success of crossing by caribou, the following linear developments occur in the CAH

range: buried pipeline, road without traffic, elevated pipeline alone (1.5 m, 5 ft, above the ground), road with traffic, pipeline and adjacent road without traffic, and pipeline and adjacent road with traffic. Traffic levels averaging 15 vehicles/hr have caused a significant decline in crossing success of caribou attempting to cross the Spine Road/Kuparuk Pipeline complex during mosquito season. Traffic levels averaging 6 vehicles/hr have not apparently affected crossing success of a road/pipeline complex. These data should not be interpreted as actual ranges of traffic frequency that can affect crossing success, but do reflect qualitatively the importance of traffic in affecting crossing success. The distribution of traffic during the day (and night) is as important as the average number—for example, if a high frequency of vehicles is concurrent with the approach of mosquito-harassed groups to a road/pipeline, these groups will probably be unable to cross the complex.

13. Although almost all quantitative studies of CAH crossing success have been conducted between late May and August, there have been changes in crossing success over the summer period. These changes in crossing success may be in response to changes in season, but it is difficult to isolate changes in season from other variables such as type of insect pests and intensity of harassment by these pests. The success of crossing linear developments is generally lower during periods of little or no insect harassment in midsummer and during calving. Because most calving occurs north of the Kuparuk Pipeline/Spine Road and parturient females are generally more sedentary, caribou may be less "motivated" to cross the complex then, as opposed to periods of mosquito harassment when their motivation to cross and reach insect relief habitat is greater. On the other hand, during oestrid fly harassment, group size is smaller and the reactivity of caribou to structures and human activity is much lower—caribou will approach and even utilize structures such as roads or under buildings as fly relief. These changes in reactivity to developments and human activity markedly affect crossing success.

14. Group size also affects the success of CAH caribou in crossing linear developments—larger groups have a lower success in crossing developments than do smaller groups. However, often large groups apparently occur in response to increased mosquito harassment; therefore, the effects of mosquito harassment can not be readily isolated from the effects of the social dynamics of large groups *per se*.

15. Buried sections of the Kuparuk Pipeline have been preferentially used by CAH caribou for crossing the pipeline. Ramps which have been constructed specifically to facilitate caribou passage are preferred over adjacent sections of elevated pipeline—this preference appears to be especially noticeable in areas where there are high levels of traffic along the road associated with the pipeline. Ramps may be a very important structure for enhancing the success by large, mosquito-harassed groups in crossing above-ground pipeline and especially road/above-ground pipeline complexes.

16. It is possible that CAH caribou are adjusting to the oil/gas development in the Kuparuk oil field. Caribou crossing success of some of the structures has increased slightly in 1983 and 1984 from that of earlier years. During midsummer 1984 maternal group occupancy along the Spine Road increased from that of several previous years. Large groups of caribou that moved southward from the coast as mosquito harassment declined then crossed the Spine Road/Kuparuk Pipeline complex directly between the Kuparuk River and Central Processing Facility (CPF-1), rather than paralleling the complex westward and "end-running" the developed area as they had done the three previous summers. These data reflect only one year however, and should not be considered definitive evidence. There are no such indications from data concerning the TAPS corridor or the Prudhoe Bay field, or concerning partutient caribou avoidance of the Milne Point Road.

National Audubon Society

NATIONAL CAPITAL OFFICE 801 PENNSYLVANIA AVENUE, S.E. WASHINGTON, D.C. 20003 (202) 547-9009

June 25, 1987

SENATE COMMITTEE ON
ENERGY AND NATURAL RESOURCES
RECEIVED
JUN 30 1987
WASHINGTON D.C. 20510

Senator Bennett Johnston
Senate Energy and Natural
Resources Committee
Washington, DC 20510

Dear Senator Johnston:

At the recent oversight hearings conducted by the full Energy and Natural Resources Committee on June 11th, Senator Daniel Evans raised a question about one aspect of our testimony which related to the possibility of fuel alternatives to oil and gasoline, which are now coming on the market. Senator Evans was concerned that we were promoting alternative fuels that we had opposed in the past. We would like to clarify the record on this point.

The first fuel we mentioned in our testimony, ethanol, is a renewable fuel from biomass which we have supported as an alternative for years. We have never opposed this fuel as a substitute for oil.

The other substitute fuel mentioned, methanol, can be produced in two different ways: from coal, or from natural gas. We have opposed its production from coal, because of the obvious pollution problems that use of coal, in most of its forms, unfortunately creates. However, and our testimony made this very clear, we strongly support production of methanol from natural gas. Indeed, of the so-called "hard" energy sources, environmentalists have always preferred natural gas in any event. Unfortunately, despite the fact that production of methanol from natural gas is a well-tested and relatively cheap technology that can come close today to competing with gasoline economically, supporters of "hard" energy paths have generally promoted coal-based methanol. We would very much like to work with those persons, to see if there is a possibility of coming to an agreement on the much more environmentally acceptable (and widely available) alternative, methanol from natural gas.

Senator Evans also was concerned about where the electricity might come from to handle the gradual increase in electric vehicles which will probably come on the market as petroleum production declines. In our view, this new electricity would come from the very source that Senator Evans has done so much to develop himself, through his pioneering and landmark efforts in his years as Chairman of the Northwest Power Planning Council: that is, electricity conservation. The penetration into the market over the next two decades of a new generation of efficient lighting technologies, many of which

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Senator Bennett Johnston
June 25, 1987
Page 2

have been made possible through government research, should alone free up sufficient electricity to account for any likely increase in use of electricity in transportation. Other energy conservation technologies are available to free up electricity to produce hydrogen, should hydrogen transportation technologies also prove viable.

We respectfully urge the Committee to keep in mind that those portions of our testimony relating to alternative fuels and conservation measures were there to illustrate not only what could be done, but also what already is being done by our free enterprise market system. These facts and trends, plus our documentation of the fact that well over 100 billion barrels of easily recoverable oil from lands that are not so environmentally sensitive exist, simply reinforce our strong conviction that there is no need to open up any portion of the Arctic National Wildlife Refuge to oil leasing or drilling.

Please incorporate this letter into the record of the hearings of June 11th, as a part of our testimony. Thank you.

Sincerely,

Brock Evans

Brock Evans
Vice President for
National Issues

523F
cc: Senator Daniel Evans

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

FRIDAY, JUNE 12, 1987

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 9:37 a.m., in room SD-366, Dirksen Senate Office Building, Hon. J. Bennett Johnston, chairman, presiding.

OPENING STATEMENT OF HON. J. BENNETT JOHNSTON, A U.S. SENATOR FROM THE STATE OF LOUISIANA

The CHAIRMAN. Good morning. The hearing this morning is a continuation of the oversight hearings the Committee has scheduled on the Secretary's report to the Congress regarding oil and gas leasing on the Coastal Plain of the Arctic National Wildlife Refuge in Alaska.

Today we are going to hear testimony from five representatives of the oil and gas industry. This will conclude this first round of hearings. The Committee is planning a trip to the ANWR in August, and it is possible that hearings will begin this fall on any legislative proposals we may have before us at the time.

Today's hearing record will remain open for two weeks to receive additional views and materials regarding the Secretary's report.

I am pleased to welcome an outstanding panel this morning. Jim Patterson, vice president for North American exploration of Conoco, Roger Herrera, manager of exploration and lands for Standard Oil Production Company in Anchorage, Mr. James Weeks, manager of Prudhoe Bay field operations for Arco in Anchorage, Tom Cook, exploration representative for Alaska Chevron, and Alan Maki, senior environmental scientist for Exxon, also from Anchorage.

So gentlemen, if you will assume the witness table and proceed as you wish. I would assume you would want Mr. Patterson to begin.

Senator Murkowski.

STATEMENT OF HON. FRANK H. MURKOWSKI, A U.S. SENATOR FROM THE STATE OF ALASKA

Senator MURKOWSKI. Thank you, Mr. Chairman. In view of the fact that we have this distinguished Alaska contingency that has come down a great distance at great expense, I want to give them a particular welcome.

I think it is fair to say that the hearings yesterday concluded sometime after 2 p.m.

The CHAIRMAN. On a note of agreement, I assume.

Senator MURKOWSKI. Well, a note of conclusion. As I summarized at the end, there was not one unspoken thought left at the end of the environmental panel. Mr. Chairman, and I share your enthusiasm that this is the last of our four scheduled oversight hearings.

I have had to get my suits pressed as a consequence of the time spent in this position. The Committee, I think, though, heard some very serious allegations yesterday concerning the oil and gas operations at Prudhoe Bay.

We were told that there are significant air pollution problems associated with the activity there. We were told that the oil companies routinely discharge hazardous waste on the tundra and that Prudhoe Bay is a giant Superfund site waiting to happen.

I found those rather extraordinary descriptions of activity there. And I think it is important, Mr. Chairman, that today's witnesses address and respond to those allegations.

The oil industry's record of operations at Prudhoe Bay certainly will be a substantial factor in determining the deliberations of this Committee on whether to permit oil and gas exploration and leasing on the Coastal Plain of ANWR.

And I think yesterday's testimony raised many questions with respect to the record that need to be answered this morning by the industry. I think, Mr. Chairman, in scheduling these hearings you have initiated certainly the critical first step in what is a long and difficult legislative process on this issue.

Again, I think we have got a good record and a complete one, and in my opinion one that will support opening ultimately the Coastal Plain to leasing. Senator Stevens and I respectfully acknowledge and appreciate your willingness to allow us some time this summer to hold a hearing in Alaska on this matter.

I am very pleased at your announcement of the energy trip to Alaska. I think it will be very beneficial to our Committee members to allow them to see firsthand what we have been talking about here.

I look forward to proceeding this morning, and I think that we can expect the industry to be forthright in addressing many of the concerns that have been enunciated in this process. I thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Murkowski.

Mr. Patterson.

STATEMENT OF JIM PATTERSON, VICE PRESIDENT, NORTH AMERICAN EXPLORATION, CONOCO, INC.

Mr. PATTERSON. Mr. Chairman, Senator, good morning. Our industry panel this morning is made up of representatives from five companies, each of whom will address a different aspect of the energy situation with industry operations. We hope we will cover the broadest range of issues with a minimum amount of duplication.

I am Jim Patterson, vice president of North American exploration with Conoco, Inc. I will set the stage by discussing the world petroleum situation, U.S. energy security, and the role of the ANWR Coastal Plain in our energy future.

Roger Herrera, manager of exploration and lands with Standard Alaska Production Company, will then discuss industry operational practices and environmental compliances on a number of issues raised at the hearings yesterday.

Following his testimony we have Dr. Alan Maki, senior environmental scientist with Exxon Corporation, U.S.A., who will discuss wildlife resources and particularly the caribou concerns.

Mr. James Weeks, manager of the Prudhoe Bay field operations for Arco Alaska, Inc. will speak to oil and gas development on the North Slope, focusing on the advancement of technological aspects, environmental and operational practices.

Finally, we have Mr. Thomas Cook, exploration representative for Chevron U.S.A., Inc., who will provide the Committee with an overview of the existing legal and regulatory framework under which the industry has to operate in Alaska.

At the outset of our testimony I would like to request that the full statement of each witness be placed in the hearing record. If this is agreeable to the Committee, we will then simply summarize our remarks.

The CHAIRMAN. Yes. Those statements will be put in the record.

Mr. PATTERSON. Thank you, sir. I will commence my comments then.

My topic is the world petroleum situation, its relationship to the U.S. energy security scene, and the role of the Arctic National Wildlife Refuge in supporting the management of our future energy security.

The temporary benefit to consumers, which resulted in the sharp decline in oil prices last year, has resulted in a dramatic reduction in exploration and production activities worldwide.

This occurrence, coupled with increasing demand levels, provides a greater future reliance on OPEC oil from the Arabian Gulf area. The inevitable consequence is that the United States and other free world nations may be facing significant periods of vulnerability in the energy security area in the remaining years of this century and beyond.

There is no question that conservation and alternative energy sources are important components of a successful energy security management program. These options do not, however, have the potential to displace petroleum as the key energy resource in the foreseeable future.

Consequently, petroleum supply and demand will continue to be the central focus of the energy security policies of this country and of other countries. In my opinion, the free world industrialized nations cannot avoid increasing reliance on oil from the Arabian Gulf area, which holds over 60 percent of the world's currently developable oil reserves.

We must, however, take prudent steps to strategically manage this dependence by controlling its rate of growth. Now this challenge is particularly acute in the United States, with the high cost nature of the discovered and undiscovered resource base, makes our production capacity extremely sensitive to depressed price levels.

The CHAIRMAN. Mr. Patterson, let me interrupt you at that point. I have read your statement and we have also had a whole series of hearings on the world oil energy situation.

I certainly agree that it is very frightening. I think it is more frightening than you do because I think we ought to have an oil import fee. But will you or the other witnesses talk about the size of the potential field in ANWR?

Mr. PATTERSON. Yes, sir. We can speak to that. But I might, with your permission, speak to it right at this moment.

The CHAIRMAN. Yes.

Mr. PATTERSON. The industry is reluctant to quote what size of reserves may be present in the ANWR area.

The industry feels that we can only determine that after we have had the opportunity to move into the area and drill a number of the prospects that have been identified on the early seismic data that is available.

The CHAIRMAN. I think the range of estimates is 600 million barrels to 9.2 billion or something.

Mr. PATTERSON. Well, some of the figures even go as high, Mr. Chairman, as 23 billion. That, in my estimation, is an extremely optimistic estimate of the reserves that might be present.

But the bottom line is that we will never know what reserves may be present until the area is opened up for leasing and the industry has the opportunity to test the prospects which have presently been identified with the drill.

The CHAIRMAN. Now, as I understand it, the figure that is used is something like a 20 percent chance, or 21 percent chance of recoverable, economically recoverable reserves. Do you go along with that figure?

Mr. PATTERSON. Yes, sir. I would.

The CHAIRMAN. Is there much higher likelihood than 21 percent of there being oil there, but owing to the difficulty and the expense, you have to have such large quantities that it is reduced to 21 percent of recoverable reserves. Is that right?

Mr. PATTERSON. Well, Mr. Chairman, no. The 21 percent that I believe you are referring to is the risk factor associated with finding any reserves in the ANWR at all.

The CHAIRMAN. Oh, any at all.

Mr. PATTERSON. Yes, sir. And that risk factor is one that the industry is familiar with, and we find an acceptable risk. That is the one in five figure that is often quoted as the discovery rate that might occur.

The CHAIRMAN. Well, the Arctic National Wildlife Refuge Coastal Plain Resource Assessment, put out by the Department of the Interior, says, the 19 percent chance for the 1.5 million acre 1002 area thus indicates a very high potential when compared to the 27 percent.

Mr. PATTERSON. Yes, sir. That figure is correct, and we would agree with that figure. But my point is simply that that is an acceptable risk.

If you take Alaska as a whole, Mr. Chairman, the percentage is only 2 percent. That is economic discoveries that have been found in Alaska today from all the wells that have been drilled.

The **Chairman**. The economically recoverable oil for 1002 would be 440 million barrels? In other words, you need that much.

Mr. **Patterson**. Yes, sir. We are of the opinion that that would probably be the minimum size accumulation that could be developed in the area.

And we also concur with the figure that you quoted, the one in five——

The **Chairman**. Now, is that one in five of finding 440 million barrels, or one in five of finding any?

Mr. **Patterson**. Well, I think it is one in five of finding 400 million barrels.

The **Chairman**. Okay, that is what Interior says.

Mr. **Patterson**. That is correct.

The **Chairman**. Okay.

Mr. **Patterson**. The risk that you run is that you will find a smaller accumulation and it will not be economically developable.

[The prepared statement of Mr. Patterson follows:]

Senate Energy Committee Hearings
on the
Arctic National Wildlife Refuge

J. C. Patterson

June 12, 1987

Mr. Chairman, Senators. I am pleased to appear before you today. My name is Jim Patterson. I am Vice President for North American Exploration with Conoco Inc., a subsidiary of the Du Pont Company.

My topic today is the world petroleum situation, its relationship to U.S. energy security, and the role of the Arctic National Wildlife Refuge in enhancing our future energy security.

In 1985, the Secretary of Energy requested that the National Petroleum Council, headed by then Conoco Chairman Ralph Bailey, prepare a study of the world energy outlook through the year 2000. My company as well as many others participated in the preparation of that study, which was released in February 1987. My remarks, will in part, rely on projections and conclusions made in this study.

The dramatic decline in oil prices that occurred in 1986 was a two-edged sword. On the positive side, lower oil prices provided a temporary benefit to consumers by reducing their energy expenditures and lowering inflation.

On the negative side, domestic exploration and development activity has fallen drastically during the past two years, significantly reducing the likelihood that adeqaate petroleum reserve additions will be discovered in the United States over the next decade.

The inevitable consequence is that significant periods of vulnerability in the energy security area will occur during the 1990's.

Increasing energy vulnerability will be evident not only in the United States, but also in other industrialized nations and developing countries. Many, including ourselves, will become more dependent upon petroleum imports to sustain economic growth.

Some would argue that conservation and alternative energy sources alone are sufficient tools to combat increasing energy dependence. While I agree that both conservation and development of alternate energy sources are important components of sound energy policy, I do not believe that they will displace petroleum as the key energy resource in the foreseeable future.

Therefore, petroleum supply and demand will continue to be the central focus of the energy security policies of this country and others.

By the year 2000, non-OPEC world oil production is expected to decrease from 1985 levels by about 25%. At the same time that production is decreasing, consumption is expected to rise by up to 26%.

The widening gap between non-OPEC petroleum production and consumption will lead, inevitably, to a situation where imported oil will play a larger role in satisfying petroleum demand.

Much of this oil will come from the Middle East. The region surrounding the Arbian Gulf holds 63% of the free world's oil reserves that can be economically developed with current technology. In contrast, the United States and Western Europe combined hold less than 10% of recoverable reserves. It has been predicted that by the year 2000, nearly half of the free world's oil production will be supplied by Middle East OPEC countries.

In my opinion, the free world industrialized countries cannot avoid increasing reliance on oil from the Arabian Gulf area. We must, however, take prudent steps to reduce our dependence.

The more gradual the growth in our dependence, the greater will be our ability to manage the economic and political ramifications.

The trends I have referred to concerning the world petroleum situation are already well advanced in this country. On the supply side, the United States has been particularly hard hit, due to the smaller average size of U.S. discoveries and higher unit costs.

Availability of capital for new project financing, particularly for independent producers, has become increasingly difficult to obtain, due to highly volatile oil prices and deteriorating industry profitability.

Last year, U.S. petroleum exploration and development spending declined 36% over the previous year. Today, the number of drilling rigs in operation amounts to only about 21% of those operating in 1981. As a result, replacement of reserves has fallen off sharply.

At the same time, low oil prices are stimulating increased demand. During the first half of 1986, U.S. consumption of petroleum products increased by 2% over the comparable period for 1985.

Even more notable is the 4.3% increase in consumption from June 1985 to June 1986. Thus, by the year 2000 U.S.

consumption may approach 20 million barrels per day, while domestic supply could be around 6 million barrels per day

As a result of these trends, we are rapidly returning to an uncomfortably high level of imports. In 1985, U.S. crude oil imports stood at 27% of total consumption. In 1986, that figure was nearly 33%. We foresee similar or higher import dependence for 1987. U.S. import levels above 50% seem unavoidable in the 1990's.

While all future forecasts are subject to question, the continued chance of a major oil supply disruption, increasing consumption, and a depleting domestic resource base all set the stage for an accelerating swing toward much greater energy security risk in the future.

Increased dependence on imports raises serious National Security issues. As our import dependence increases, we are likely to experience diminished flexibility in our foreign policy.

Moreover, as recent developments in the Arabian Gulf illustrate, the United States is more likely to be drawn into supply-threatening conflict situations as our import dependence increases.

The impact on the U.S. economy of rising imports is also substantial. In 1985, oil imports added $45 billion to the trade deficit: the single largest item in the U.S. international trade account.

Since increased demand for imports carries with it the prospect of higher oil prices, the balance of trade impact tends to snowball as import levels increase. In the face of these unsettling trends, we must not forget the significant gains we have made over the last decade to improve energy security. We have made and are continuing to make substantial advances in energy efficiency.

Despite increases in population and GNP, the nation uses no more energy today (and less oil) than it did in 1973. We have also made a considerable commitment to filling the Strategic Petroleum Reserve. Unless we act to avoid undue import dependence, however, we may be sacrificing these gains.

The United States is now walking an energy tightrope, below which is stretched a very tattered energy safety net. Although the Strategic Petroleum Reserve and conservation efforts continue to provide some degree of protection, there remains a gaping hole created by our failure to develop new domestic reserves.

The United States has essentially two policy options available in the face of rising imports. First, we can simply stick our heads in the sand and ignore the implications of rising imports. Given the long lead times necessary to bring new discoveries to production, this course of action could reduce our future foreign policy flexibility and increase our economic exposure to oil supply disruptions.

Eventually, a "head in the sand" approach would require a "panic" response, such as we saw in the wake of previous supply disruptions. This could include various market restrictions such as the price controls for natural gas instituted in the 1970's or massive federal subsidies for the development of synthetic fuels.

Despite the "quick fix" appeal of such measures, experience has taught us that panic solutions lead to market distortions, and economic waste. We need only recall the expansive drilling programs aimed at recovering $10 per MCF gas or the ambitious alternative fuels projects - - many only recently scrapped - - to appreciate the inefficiencies created by such programs.

We must consider a wiser course of action, one which seeks to diversify the sources of U.S. petroleum supply even as we actively pursue efforts to improve energy efficiency and undertake research and development on alternative fuels. Under such a policy, the emphasis must be on developing reserves at home and in politically stable foreign countries.

This option recognizes that, for the foreseeable future, oil will remain our most economic energy resource. It is also consistent with the view of most analysts, that oil imports cannot be entirely avoided, but must be skillfully managed.

Finally, it reflects the fact that we have in this country a highly prospective area, yet to be fully explored, in the Arctic National Wildlife Refuge, which could make a significant contribution to domestic supply.

The importance of ANWR in meeting future needs should not be underestimated. Onshore, much of the Lower 48 have been explored and produced, and we have no expectations for the discovery of additional giant fields in this area.

Moreover, many Federal lands have been closed to mineral leasing by Administrative or Legislative withdrawals. Reserves on the OCS, particularly offshore California and in the deeper waters of the Gulf of Mexico, should help assure a secure supply of domestic petroleum in the 1990's. Looking towards our energy needs in the early twenty-first century, however, it is critical that we begin to explore high potential, long lead time opportunities such as ANWR promptly.

As an experienced petroleum explorationist, I believe that ANWR exhibits the level of significant resource potential needed to justify the major investment levels which will be required to explore the coastal plain.

If ANWR reserves prove to be anywhere near the size of the Prudhoe Bay Field, we would be able to reduce import dependence in the year 2000 by more than one million barrels of oil per day, or up to 20% of projected domestic supply.

We must remember that, had we not had the foresight to undertake operations at Prudhoe Bay, America's import dependence would have been more than one third higher in recent years. We must now bring such foresight to bear on ANWR.

With Conoco's considerable experience in operating in fragile environments, including Alaska and the Aransas National Wildlife Refuge in Texas, I feel confident that Conoco and the industry are fully capable of developing ANWR reserves in an ecologically responsible manner. We also are concerned with the natural environment.

Exploration and development of ANWR and other prospective domestic areas cannot independently ensure that America's energy safety net will be sufficient as we approach the end of the century. I do believe, however, that opportunities such as ANWR are critical components of a prudent energy strategy for the future.

The **Chairman**. With the permission of my colleagues, why do we not move on to Mr. Herrera. I did not mean to really question you in great detail.

But why do not move on to Roger Herrera, and get the rest of the panel, and then we will go to questioning, if that is all right.

Mr. Herrera.

STATEMENT OF ROGER C. HERRERA, MANAGER FOR EXPLORATION AND LANDS, STANDARD ALASKA PRODUCTION CO.

Mr. **Herrera**. Thank you, Mr. Chairman. Mr. Chairman, my written testimony will not bear much relationship to what you hear from me now, mainly because when I wrote it——

The **Chairman**. Have you changed your mind?

Mr. **Herrera**. I beg your pardon?

The **Chairman**. Have you changed your mind?

Mr. **Herrera**. Well, we always have to be flexible, Mr. Chairman. When I wrote it I thought I was going to be the major representative on this panel dealing with caribou issues and other biological environmental issues.

We now have Dr. Maki, who is better qualified than I am to deal with that matter. So I will move on to things which are more in my sphere, which are operational concerns of working on the Coastal Plain or in the Arctic in general.

Basically, I have spent 18 years of my oil company career in the Arctic, and about 15 months of those 18 years have been spent in various small tents living in the tundra areas of the north in all four seasons of the year.

If nothing else, that experience tends to knock the emotionalism out of me as far as my attitude on the Arctic was concerned. I think it is necessary to state that it taught me an attitude which was more pragmatic and realistic than one often hears in comments on the Arctic.

The **Chairman**. I understand, by the way, that you were part of the team that did some of the original exploration at Prudhoe Bay.

Mr. **Herrera**. That is correct, Mr. Chairman. I am older than I look. That is true.

The **Chairman**. I would not say that. Nice thing about being around long enough, you could now take single-handed credit and there are not enough people around who could deny it.

Mr. **Herrera**. Most of the others have died off. Yes.

Senator **Murkowski**. The cold weather slows aging, Mr. Chairman.

Mr. **Herrera**. The point I was making is that the concept that the fragility of the Arctic is one which I would firmly disagree with.

I think it arose because of the easily observed fact that if you do disturb the tundra in the Arctic, it leads to thermal erosion and scarring of the landscape. This was a characteristic of much of the early work done by the U.S. Navy and also in the early 1960s by the oil industry in the Arctic.

Nobody knew any better. And consequently, some of the marks that one can see in NPRA in particular are caused by that phenomenon. It gave rise, though, to the concept of the fragile Arctic, which quickly pushed over into the area of wildlife.

And people assumed that the mammals and the plants are on the edge of extinction, or on the edge of survival, if you like, in the Arctic. I think nothing could be further from the truth or reality.

In fact, there is no biological reason to suggest that animals are on the edge of survival in that harsh climate. There are lots of data available though to clearly indicate that they are all physiologically adapted to that harsh, long winter and cold summer.

This is true not only of the year-round residents, but also the migrating summer-only residents. They are adapted to cope with that situation. And nothing except some extreme trauma is going to upset the balance of nature in the Arctic. It is not waiting to fall over the edge with a little push.

In essence, one can say, I think with a degree of certainty, that the fragility of species in the Arctic is no more or no greater or no less than those of species in temperate climates, on an Oklahoma farmland, or in a tropical rain forest.

And if you mistreat the Arctic habitat, certainly it shows declines in productivity. The same is true in Oklahoma or a tropical rain forest. There is no more resilience or fragility in the Arctic than in any other area.

And I think it is necessary to put that myth to bed, because it should not determine what we are allowed to do or not allowed to do in this cold region.

One other, what I would describe as a myth, Mr. Chairman, which I would like to comment on also, is the uniqueness of the 1002 area, which is the area that we are considering.

As you are aware, 8 million acres of the ANWR area in general has been designated as wilderness, and that includes about 450,000 acres of land which is in general described as Coastal Plain area between the Achilic River and the Canadian border.

On the other side of the Canadian border, you have the Northern Yukon National Park, about 3 million acres, which is in very similar habitat. The point I am making, that within that wilderness area, which is protected for all time, presumably, we have all the features which are worthy of preservation and which represent Arctic ecosystems.

We heard that word a lot yesterday. Nobody defined it. But nevertheless it is a good buzz word. We have mountain ranges in their totality. We have glaciers. We have total river systems.

In fact, on the area of the Coastal Plain, close to the Canadian border, which is wilderness, there are five complete river systems represented. We have forests in the southern part of the Brooks Range in the wilderness area.

We have lots of wetlands. We have the Coastal Plain, river deltas. And everything that people talk about as special and worthy of protection is in fact protected in the wilderness area.

The same is true of the biology of the area. There is nothing which is in the 1002 area which is not equally or better represented in the areas which are protected by wilderness.

And I think it is reasonable to conclude that the most unique factor of the 1002 area is in fact its geology and the potential of that geology to contain large quantities of oil and gas. All the other things that we talk about are not unique to that area. That one thing probably is.

Let me move on to an issue which has become very contentious, and Mr. Chairman, I have submitted for the record a few white papers, which are not voluminous, but certainly of longer length than I would care to go through right now. One of them is on air quality issues.

The **Chairman**. It is on what?

Mr. **Herrera**. Pardon?

Senator **Murkowski**. Air quality.

The **Chairman**. Air quality?

Mr. **Herrera**. Yes. And a lot of the relevant graphs which I would like to address very quickly are at the back of my testimony also, or in that white paper.

In particular, the cover of the white paper perhaps puts to bed, so to speak, some of the comments which have been made about the air quality at Prudhoe Bay.

What we see on the cover is a graph showing air qualities of some of the major cities in the United States of America in relationship to the primary national ambient air quality standards.

And one sees and bear in mind, Mr. Chairman, that those ambient air quality standards were set up in 1970, I believe, essentially to protect human health. They were sort of worst quality standards.

Asthmatic people would start to suffer if the air quality got below those standards. Normal healthy people, obviously, would not notice air quality at the national standards.

But the important thing is the ambient air quality is a thing that one must be concerned about, because that is the thing that affects human health, and obviously biological aspects of the same environment, the same time.

What we see on that table, and all the information which was used to construct this graph was obtained from the departments of environmental conservation or other similarly named departments of these individual cities.

What we see, of course, is that, as one would expect, that the ambient air quality of nitrogen dioxide is above national standards in the city of Los Angeles, somewhat below it, about 70 percent of national standards for New York City, and also Washington, DC, does not have all that great air. Chicago similarly.

And we also see Lake Tahoe, which is at about a 20 percent level of the ambient air quality standards, and Prudhoe Bay significantly below Lake Tahoe. Mr. Chairman, I would suggest that these are facts which can be backed up in any public record.

That is where they are obtained from. And I would suggest that they represent the true picture of what is happening with air quality with regard specifically to nitrogen dioxide at the Prudhoe Bay field.

Now, there are other concerns, there are other pollutants which one must be concerned with, obviously, at Prudhoe Bay. However, nitrogen dioxide, or NOx, is the one major concern in that area, simply because we do not have motorcars on the North Slope, so carbon monoxide and pollutants from motorcars are simply not put into the atmosphere in any quantity at all.

On the other hand, all our power sources, our heat sources, our turbines burn natural gas. Fortunately, that natural gas is very low in sulfur dioxide, and consequently our sulfur dioxide levels up there are hardly measurable, compared with national standards.

But we do put into the atmosphere significant quantities of NOx. This ambient air quality measurement that you see here is an indication of those quantities, compared with the national standards in other large cities.

There has been a lot said about the lack of testing of air quality at Prudhoe Bay. And if I may I would like to set the record straight on that issue. In essence, when Prudhoe Bay had been started up, it started in essence producing oil in 1977, I believe.

In 1979, when the capacities of gas-fired turbines at Prudhoe Bay approximated about 600,000 horsepower, and we had heating capacity of about 770 million BTUs per hour at the field at that time, it was determined by EPA and the operators that baseline data on the field at that time should be collected.

And a year's study was made, and that is in the public record with the Department of Environmental Conservation and the Federal Environmental Protection Agency.

In the interim, since that initial year-long study, every new item of potentially polluting equipment which has been put into Prudhoe Bay, has had to comply with requirements of EPA, such as the prevention of significant deterioration.

This is a standard which they have set up for general equipment, and also best available control technology, another standard for industrial plants and so on. There was also a further standard which has to be complied with, new source performance standards.

So as soon as a piece of new equipment has been put on line, since that initial survey in 1979, 1980, it has been tested and has had to meet all those stringent standards set up by the Federal government. In all cases, such equipment has done so.

EPA also built a model. They had the data from the various tests, and by the way, the equipment is tested at 90 percent of its maximum capacity. This is a physical test. The worst time of the year, as far as pollutants are concerned, on hot days in the summer.

We do have a few hot days in Prudhoe Bay even. And this was the measurement taken to ascertain that that equipment complied with Federal regulations. In all cases, the equipment did comply.

At the same time, with all those results, EPA undertook a modeling study of the whole area to try to predict what was happening regionwide to ambient air quality, in that it is very expensive to measure it continually.

But if you can get a good idea from your modeling, your model, where a plant is, what its output is, so on and so forth, that certainly helps you and allays any concerns or points out concerns.

The statement that Dr. Hair made yesterday suggesting that the modeling technique is inferior arose from the fact that a model was unable to predict downwash adjacent to buildings.

This is a phenomenon which obviously is unique to a particular facility or building. And it led to a difficulty in modeling effects. Consequently, a new model resulting from wind tunnel tests at the University of Washington, was constructed by EPA.

And the difference between the new model and the previous model was orders of magnitude. In fact, Dr. Hair yesterday quoted those differences. But what he was comparing was not the model with reality, but the old model with the new model.

Which of course is of not much consequence when we find that when we actually take the real measurements, they are much lower than the models predicted. So the reality is better than the predictions.

Obviously, EPA is working to improve those predictions and is in the throes now of a tracer study to see if they can ascertain downwash situations and modify the model accordingly. But I just wanted to go through that to correct the remarks of yesterday.

The other pollutants which are cause for concern nationally, and obviously have to be looked at on the North Slope are carbon monoxide, which hardly exists in measurable quantities up there; ozone certainly does; sulfur dioxide as I mentioned, very, very low levels, because we do not have sulfur rich fuel; total suspended particulates, dust particles from pollutant machinery, which is of concern; and lead.

Lead is not an issue on the North Slope. It is at very low levels. The particulates, though, have been quoted as sometimes exceeding Federal standards.

I should add, Mr. Chairman, that in July of last year, 1986, after a year's study of how to carry out a new one-year test of ambient air quality throughout the Kuparuk-Prudhoe regions, a new program was undertaken by third party contractors under the oversight of EPA and the state Department of Environmental Conservation.

That year's program is ongoing now. And in the air quality paper that you have, and on some of the graphs, you see the initial results, which are public results from the latest program.

Once again, what one finds is that the nitrogen dioxide values at Prudhoe Bay and at Kuparuk are both very close to the worst source of pollutants, which is the central compression plants, where there are 12, 13 huge turbines operating all the time to reinject the gas into the ground.

So the values taken adjacent to that worst source and regional values are both in the 20 percentile area, compared with the national standard. Clean air, indeed. Sulfur dioxide is very, very low, as you can see on the graphs.

The particulate concentrations, however, show at the Kuparuk field in particular, some apparent occasions when they exceeded national standards, or secondary standards which are more onerous than the nationwide standards.

The reason for this is simply that the wind blows rather heavily in the summer time at Prudhoe Bay, and in fact what we are measuring when those high values were recorded was dust in the atmosphere. Normal dust off the road and tundra.

This is quite clear when one looks at the same measurements in the winter time, when the snow cover is there, and particulate measurements are extraordinarily low. So I think we can say with a degree of certainty that there is not a problem with particulate pollution at Prudhoe Bay.

Ozone is perhaps higher than some of the others, but way beneath national standards, which one would expect, because to get ozone concentrations you generally need lots of sunlight and lots of warmth, and we are not too blessed with either of those up there. And carbon monoxide I have mentioned.

And so, really, I would suggest, Mr. Chairman, that these public data would indicate that the air quality at Prudhoe Bay is exemplary, and as I mentioned, better than that of Lake Tahoe, which I think we all rather imagine to be a nice place.

Let me move on, if I may, very quickly, and discuss an exploration scenario, which I should know a little bit about, because that is what I spent all my time doing in the Arctic, trying to find new oil. It is not easy. Despite your kind remarks, occasionally one stumbles upon these oil fields, but not too often.

I think it is necessary to understand a little bit about the geology of the Coastal Plain, not in technical terms, but just in common sense terms. Perhaps, Mr. Chairman, that understanding can come by looking at the map, which was in the 1002 report.

I have added a Xerox copy of it to your handout, which shows what the Department of Interior has found from the seismic records regarding the development of structures, geological structures in the 1002 area.

They have delineated 26 such structures on the Coastal Plain. Now, some of those obviously, well, obviously to me, perhaps not to you, Mr. Chairman, because you have not seen all the data.

But basically, the way these structures were identified was utilizing the 1,300 line miles of seismic, which were shot over the Coastal Plain in 1984 and 1985, or 1985, 1986. That grid was about 12 by 6 miles, in essence.

Every 12 miles in one direction, 6 miles in another, there was a seismic line.

The CHAIRMAN. What one was this?

Mr. HERRERA. This is the basis for this map that I am talking of. The way they arrived at the 26 structures that we see on the map.

They used the seismic information, that is the only information anybody has.

The CHAIRMAN. What was 12 by 6?

Mr. HERRERA. That is not shown on this map, Mr. Chairman, but in fact that was the sort of distance between the seismic lines that were shot on the Coastal Plain to obtain this picture.

The point is that, when you have less than detailed information, it is only with a little bit of imagination that one can produce the map that you see in front of you. There is not too much certainty about it.

On the other hand, those of us that have had the sort of dubious pleasure of poring over these geophysical records would tend to agree in general terms with this map. It might not be accurate in any one location, and certainly the shapes that you see over here are going to be changed with time as we get new information.

But in general terms, it is probably an indication of what is going on there geologically. I think that any layperson can look at this map and reach some conclusions. I mean, they would conclude that this is obviously a map which is simplifying the situation.

But equally obviously, it is a rather complicated map. And I think that conclusion would be correct, Mr. Chairman, because the geology up there is very, very complicated. And this is a simplified version of it.

The point I am making is that what we are trying to achieve in this exercise, we the industry certainly, and I hope you, is to find oil and gas and to produce it in a safe fashion from this area for the national good, obviously.

How do we do that, and how easy is it going to be? This is what I want to talk about. It is not going to be at all easy.

This geology is very complicated, and I cannot tell you, and nobody else can either, where the best place to drill a well, or a dozen wells, or two dozen wells in this area are, based on the sort of knowledge we have at the present time.

I can certainly suggest where a well could be drilled. And of course I only suggest that if I can convince people that that is where I am going to find oil, because this well is going to cost between $25 million and $40 million.

So one does not sort of waste that sort of money on a whim. One aims it specifically at trying to find oil. But I would probably be wrong. We are not going to find oil, in my view, unless we have a stroke of luck, which only happens once a generation with our first well, or even our first 10 wells.

We will find oil indications. The whole of the geological knowledge of this area indicates that it is prolifically oily, and any well you put down almost anywhere, you will find indications of oil.

But it is not going to find the sort of thing that we really need, which is half a billion or a billion barrels of oil, to have a producible economic oil field. To find that I suspect that we are going to have to be prepared, we the industry, everybody, to look forward to an exploration scenario involving 15, 20, even 30 wells.

And you have to bear in mind one other thing. The Interior Department says there are 26 structures. I am not suggesting that we drill a hole on each of those structures at all.

We will modify our program as we get more subsurface information, as we drill through our exploratory wells. It could well be that the oil in this area, if there is any, is going to be found in what we call stratographic traps.

Prudhoe Bay is a stratographic trap, the largest oil field in North America. This map is not recognizing stratographic maps at all. There may be huge stratographic traps here, which we are not going to find until we start drilling the wells and getting more information on the area.

You know, it is interesting to consider what has happened elsewhere in the world. For example, in the North Sea, it took 28 wells before the first commercial oil field was found.

And I think it is a truism to say that, even that discovery had a modicum of luck involved in it, because the operators drilled beneath the area where they had good seismic information.

They drilled into all the beds and they did not know what they were drilling into or what the structure was, and that is how they made the discovery. The situation we have here is almost the same.

The seismic records as you go at depth become very complicated and very vague, and we do not know, we cannot see with any certainty the sort of structural picture of depth in the Coastal Plain.

Therefore, we have to be prepared to make hay slowly in this area, to learn as we go along from these wells, and not get too disappointed if the first dozen wells do not turn up the field that we are all waiting for.

What we can say, though, certainly from our present level of knowledge, is that the geological characteristics of this area are such that there is a very good chance that if we persevere we will find this giant oil field we all want.

Pertinent to that little discussion, Mr. Chairman, is of course timing. We are all concerned about our future oil supply and our future national security, and we are arguing that perhaps the 1002 area can ameliorate that situation somewhere down the line, perhaps around the turn of the century.

That is only pertinent if we find this discovery in the first two or three years. If it takes us eight or 10 years to find it, albeit with some encouragement along with way, then our first oil to market is going to be that time beyond the turn of the century.

So we have got long odds here, and I think we all should realistically understand what those odds are.

Senator **Bradley**. What is the lead time again?

Mr. **Herrera**. Senator, what I am suggesting is that the normal scenario that one hears from the lease sale to first production from the Coastal Plain suggests that one can expect production around the turn of the century, about the year 2000.

For example, if Congress made a decision on opening up the Coastal Plain next year, there is a scenario which has been presented indicating first production around the year 2000.

That is an optimistic scenario. It assumes that the discovery is made, the exploratory well which makes the initial discovery is made in the first two or three seasons.

If it drags out beyond that, then obviously first production is going to be pushed into the future also.

Senator **Bradley**. So it is 15 years.

Mr. **Herrera**. It is going to be 15 years under any scenario, I think. Yes.

Mr. Chairman, rather than going on, and there are many other things that I could talk about, perhaps I should stop at this stage, not mention gravel and the sort of research that is being done in the Arctic, the state of knowledge of the Arctic, if you like, both physical knowledge and biological.

There are reserve pits that we need to talk about. Perhaps causeways, and certainly biological discussions. Perhaps I should stop at this time, and no doubt some of these other concerns will come out in the questions.

So with your permission, I will stop and hand it over to Dr. Maki, Mr. Chairman.

[The prepared statement of Mr. Herrera follows:]

TESTIMONY OF

ROGER C. HERRERA
MANAGER FOR EXPLORATION & LANDS
STANDARD ALASKA PRODUCTION COMPANY
ANCHORAGE, ALASKA

BEFORE THE
SENATE ENERGY COMMITTEE

FRIDAY, JUNE 12, 1987

Environmental and Operational Issues Affecting the Coastal Plain of ANWR

Washington, D.C.

Mr. Chairman, Members of the Senate Energy Committee:

My name is Roger Herrera. I am the Manager for Exploration and Lands of the Standard Alaska Production Company based in Anchorage. I have spent 18 years of my career exploring for oil in the Arctic, fourteen of them in Alaska. Today my testimony will concentrate on the environmental and operational aspects of oil exploration and development activities on the coastal plain of the Arctic National Wildlife Refuge (ANWR) with particular emphasis on the concerns for the Porcupine Caribou Herd, and practical considerations of protecting the Arctic environment and finding and producing its oil resources.

To the greatest extent possible, I intend to discuss biological and technical facts, therefore it is pertinent to start with a comment on the "fragility" of the Arctic. There is a commonly held belief that the Arctic is, "one of the most sensitive and fragile areas on the continent", and that animals living there are on the edge of survival. There is no biological evidence to support this view, but there are many data that demonstrate that polar bears, caribou, muskoxen, waterfowl and Arctic fish are physiologically adapted to live under conditions of extreme cold and short summers.

The concept of a "fragile" Arctic has probably arisen from the phenomenon of thermal erosion. This process occurs when the insulating surface mat of tundra vegetation is removed, leading to summer melting of exposed underlying permafrost and subsidence of soils in the exposed area. Vehicle tracks made (by the U.S. Navy) as long ago as the 1940s, have scarred the landscape in this fashion, although today, with more enlightened operational practices, thermal erosion rarely occurs. But the concept of a "fragile" Arctic remains, now applied increasingly to fish and wildlife and their habitats. In reality, Arctic plants and animals are well adapted to the Arctic environment and have shown themselves to be adaptable. When the land is mistreated, it does not respond well and starts to decline in productivity. This is as true for Oklahoma farmland or a tropical rain forest as it is for Arctic tundra: all are resilient when treated well, and fragile when treated poorly. We now know from our 30 years of experience in the Arctic, particularly at Prudhoe Bay, how to treat the Arctic well, and do so on a routine basis.

Many incorrect perceptions are also responsible for the controversies associated with caribou and in particular, the Porcupine Caribou Herd, which for 6-8 weeks of the year occupies part of the coastal plain area. The only unique thing about that herd is that it freely migrates back and forth across the U.S./Canada border and is, therefore, an international herd. In all other regards it is no more unusual than any other of the seven herds in the North American and Eurasian Arctic which are larger than its 180,000 population size. Indeed it can be seriously argued that the most unique aspect of the coastal plain area is not its caribou or staging geese or muskoxen or wetlands or Arctic habitats, all of which are amply and repeatedly represented elsewhere in the Alaska Arctic, but its geology and associated oil and gas potential. That is the only aspect which is unique to the coastal plain and cannot be found in other unexplored, onshore, Arctic regions.

Nevertheless, a general perception exists that the Porcupine Caribou Herd is special and a particular concern. There are four aspects which give rise to that concern:

1. The Porcupine Caribou Herd calving areas on the coastal plain and the potential for industrial intrusion into those areas.
2. The response of caribou to oilfield development, specifically, the notion of "zones of influence" of oil facilities.
3. The potential blockage of caribou from insect relief and other areas, and
4. The differences between caribou herds, and the possible lack of applicability of the experience of oilfield development at Prudhoe Bay to what might be expected in ANWR.

Associated with these biological controversies are others which are more political or social in nature, namely, the concerns of the Yukon Territory Government and the Government of Canada, and those of native subsistence users of the Porcupine Caribou, especially residents of Arctic Village.

Fundamental to any discussion of caribou is an acceptance of two factors which have been clearly shown to have an effect on caribou populations everywhere. These are high rates of predation and excessive hunting. The main predator of the Porcupine Caribou Herd is wolves, with bears and golden eagles having a lesser effect. Throughout the Arctic region both in North America and Eurasia wolves have been persecuted by man and considerably reduced in numbers. In Alaska, this human influence has been accentuated by severe outbreaks of rabies in the late 1970s and early 1980s. Because of this circumstance, 60% of new caribou calves survive to be one year old in the Porcupine Caribou Herd and the herd population is increasing. In fact, for the same reasons caribou herds are increasing in numbers throughout the circum Arctic region.

The second factor, excessive hunting by man, is obviously something which can be controlled and there is no reason why petroleum operations can be expected to increase either of these overwhelming influences on caribou. Consequently, as has been seen at Prudhoe Bay, at the massive James Bay hydroelectric project in Canada, and at numerous locations in northern Europe, industrial activities need not adversely affect large caribou herds. As an example of steps taken by the industry at Prudhoe Bay, no firearms are allowed by oilfield workers. Possession of firearms is automatic grounds for dismissal.

The most important aspect about caribou calving is that the calves should be born in an area where they can avoid predation. That is the reason the pregnant cows migrate northwards, away from the larger wolf concentrations, to have their calves in early June on the coastal plain area of Alaska and Canada. Exactly where they calve is probably a function of snow cover and the weather, and the concentration of pregnant cows in a given area may be a defense mechanism against predators. However, the concept of the Porcupine Caribou Herd cows being "crowded" on their calving grounds, which has been voiced as a concern, is hardly borne out by calculations which show that even in their most dense accumulations, each cow has from 9.3 to 25.6 acres of territory on which to have its calf. Given the fact that there are huge variations in calving density year by year, it is difficult to see how the presence of an oilfield facility sited in a calving area would have an adverse impact on caribou by affecting calving density.

The influence of a road, or drilling facility on caribou is of some importance and a considerable amount of data exists measuring that influence. For example, a careful and controlled study by State of Alaska biologists has shown that caribou cows tend to move away from an oilfield road to a distance of 2 kilometers, thereafter there is no further influence of the road discernible. This is not to say that all caribou are displaced by 2 kilometers because some of them still utilize the area close to the road, but they do so in smaller numbers. Even if they were totally displaced there is no evidence that there is a shortage of habitat for mainland caribou. Habitat availability is not a limiting factor on population.

A major oil development on the coastal plain of ANWR (DOI development scenario) would occupy a maximum of 12,000 acres of tundra habitat, about half of which would be covered up by gravel. These estimates are based on the fact that the Prudhoe Bay Field has 1,170 acres of roadways, 3,500 acres of gravel pads for wells and facilities, and 670 acres of gravel pits and land fills, giving a total of 5,390 acres. Kuparuk, the second largest oilfield in North America, occupies 2,530 acres of tundra, and Endicott, the tenth largest oilfield, has a footprint of 400 acres in total. Thus, on the coastal plain, a maximum of 0.8% of the area would be affected by development, half of which would be little used by animals, the other half would be modified habitat but still used by wildlife, birds in particular.

Finally, the concept of roads or pipelines acting as a barrier to caribou movements has been disproved with sufficient regularity around the Arctic rim, not to be a concern. Mitigating methods of siting, building and operating such corridors are now well established and practiced. In this regard, it is worth remembering that Porcupine Caribou successfully cross the Dempster Highway in the Yukon Territory of Canada at least twice each year so they are no strangers to man-made barriers. There is no reason to believe that they would behave differently in response to a coastal plain road or suitably designed pipeline. Many other herds negotiate more extreme barriers successfully including nature's own barriers of swollen, flooded rivers; mountain ranges; snow-filled valleys and road-like gravel eskers.

(The differences between the Central Arctic Herd and the Porcupine Caribou Herd are obvious and irrefutable.) However, the argument that the experience of the successful interaction between the Prudhoe Bay oilfield activities and the Central Arctic Herd is not applicable to the Porcupine Caribou Herd ignores what has happened with the large migrating herds elsewhere in Canada and Russia. The prediction of future impacts requires the use of best professional judgment. There is no reason to think that mitigation measures effective at Prudhoe Bay, Kuparuk and Milne Point will not be equally effective in the coastal plain area of ANWR. In addition, it is in the best interest of industry to adopt appropriate measures to mitigate individual circumstances on the coastal plain. This is preferable to a grossly generalized legislative constraint that some have suggested for the coastal plain.

The position of the Canadian Government which has voiced strong concern over the possible development of oil on the coastal plain of ANWR is worthy of comment. It is without doubt a genuine concern but is somewhat belied by the amount of oil and gas exploration which has occurred within the range of the Porcupine Caribou Herd on Canadian lands. The attached map graphically illustrates that activity, and includes wells drilled within the calving area of the Porcupine Caribou Herd on the Canadian side of the border. Most of that considerable exploration effort has been unsuccessful in finding oil and therefore a decision to proceed to production has not had to be made.

One has to suspect that the Canadian attitude towards possible U.S. oil development in ANWR would have been considerably ameliorated if the Canadian exploration effort had been more successful in finding oil within the caribou range. It is pertinent to add that the geology on the Canadian lands is quite different from that of the coastal plain and therefore the lack of exploration success in the Yukon is not significant to the prospectiveness of the Alaskan acreage.

The concerns of the subsistence users of the Porcupine Caribou Herd are indicated by the fact that about 5,000 caribou are harvested every year. Approximately 4,000 of those are taken in the Yukon and Northwest Territories, primarily by residents of Old Crow and Fort McPherson. Incidentally, the harvest in Canada has increased considerably owing to the access created by the Dempster Highway. In Alaska, most harvest is by subsistence hunters from the villages of Kaktovik, Arctic Village, Venatie, Chalkyitsik and Fort Yukon. Arctic Village alone takes over 400 caribou a year.

During the exploration phase of any future development in ANWR, it is usually acknowledged that environmental impacts will be minimal and benign. This is because exploration drilling will take place in winter when caribou and other animals have moved out of the coastal plain. It is difficult to predict how long the exploration phase of activity will last, but experience elsewhere in the Arctic and in other unexplored frontier areas strongly suggests that the chances of a quick discovery leading to an early production phase are slim indeed. The reason for that is a product of the complicated geology of the coastal plain. That geology has given rise to many and varied structural and stratigraphic targets for oil drilling, none of which are delineated in any detail. In addition, an exploitable discovery has to find at least half a billion barrels of recoverable oil due to the economics. Fields of that size are statistically rare and the possibilities of correctly guessing which of the numerous structures, if any, contains such a giant field and drilling it within the first season or two are not high. Twenty-eight wells were drilled in the North Sea before such a discovery was made there, and it took industry nine years of effort and 10 dry holes before Prudhoe Bay was discovered. Offshore, in the Alaska Beaufort Sea, industry has expended over $6.5 billion since 1979 and has still not discovered a commercial oilfield in the OCS acreage.

Because of these experiences one can suggest that it may be as long as five to eight years before exploration drilling confirms the presence of a commercial oilfield on the coastal plain and many years thereafter before it is brought into production. Consequently, the subsistence harvest of Arctic Village could not even be potentially affected for the next decade, during which time our understanding of the Porcupine Caribou Herd and the possible effects of development will be better known than at present. The continuation of a low-level of predation plus a control on the number of caribou taken by hunters are the two factors which will most influence the maintenance of a subsistence hunt. Oilfield facilities, roads, and personnel do not kill caribou.

The use of mitigating measures to protect the Arctic environment from the effect of some oil activities is standard practice in Alaska and obviously must be followed on the coastal plain of ANWR. Such things as seasonal restrictions of certain activities have been used routinely but their benefits need to be rigorously examined. No one should lose sight of the desired goal if the coastal plain is opened. That goal should be the safe production of oil and gas to the benefit of the nation without detriment or damage to the environment. It is easy to become overly conservative in the desire to protect the environment to the extent that it becomes unjustifiably difficult or impossible to produce oil economically. Seasonal drilling restrictions in the exploration phase can double the cost of a well from $25 million to $50 million ± in ANWR. If those restrictions do not benefit the caribou or other animals they are designed to protect, they should be modified or dropped. Such a process occurred offshore to protect the Bowhead Whale. The restrictions were modified as their benefit, or lack thereof, became understood.

There appears to be a growing philosophy to indulge in over-protection of the environment of the coastal plain. That quickly becomes of no benefit to the environment and is detrimental to drilling. A typical example is the 500 foot set back required for a drill pad or facility from the high water mark of specified water courses. This serves to protect both the facility and the stream or river and such setbacks have been routine and effective on adjacent state acreage. We now learn that the Department of the Interior is proposing in the final 1002 report to increase the setback eightfold to 4,000 feet in ANWR. This would increase the cost of wells drilled from such locations by millions of dollars but will add nothing to the protection of the environment.

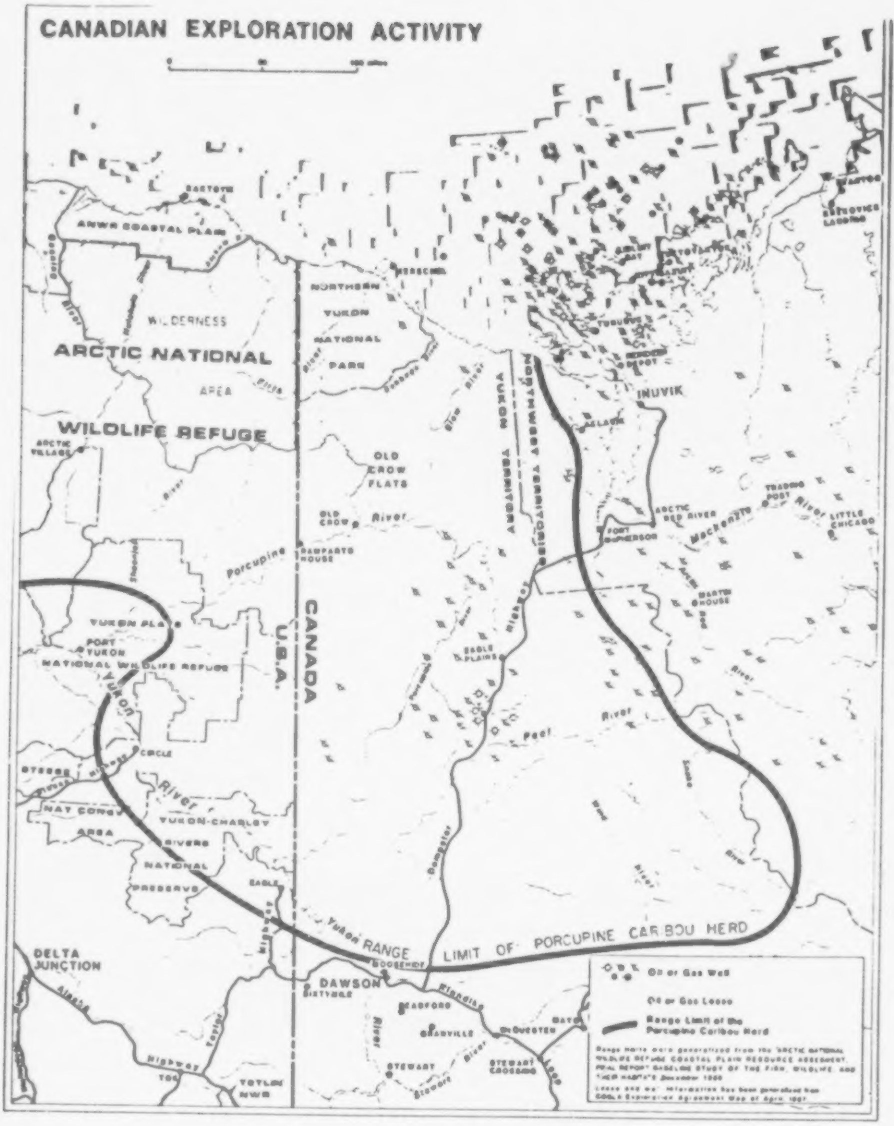
Similarly, The Department of the Interior (DOI) 1002 report has proposed a severe restriction on the use of the zone three miles inland from the coast. This is in direct contradiction to the recommendation from the Arctic Gas study of the coastal plain in the late 1970s. That study and more recent analyses carried out by Standard Oil concluded there were environmental benefits from placing facilities near the coast rather than farther south where they would intrude more into the area of calving and migrating caribou. At this time, we do not know where oil may be found in the coastal plain of ANWR and the actual location of a produceable field may make the utilization or non-utilization of the coast a moot point. But the desire to have all mitigating measures "set in concrete" before we know if and where oil is present, is not a practical or positive approach. More flexibility without lessening the resolve to protect the environment would be a better solution.

The oil industry and others has been studying the geology of Arctic Alaska is great detail for the past 30 years. Systematic biological studies in ANWR and elsewhere have been ongoing for 15 years. The drilling of oil wells in the Arctic has been more or less continuous since 1946, and the production of oil has been ongoing for the past 10 years. Hundreds of millions of dollars have been spent on biological and physical research in Alaska, and our state of knowledge enables us to work safely in that environment.

We cannot be sure that the coastal plain contains produceable oilfields, but we are sure that if such fields exist, they can be produced without significant affects to the wildlife or to the human residents of the area.

Mr. Chairman, with the permission of the Committee, I would like to submit the comments of The Standard Oil Company to the Final Report for the 1002 area by the Department of the Interior. I urge all members of the Committee to review its contents as it is a comprehensive review of environmental assets associated with the coastal plain. In particular, it discusses air quality in the Arctic, clean water, the disposal of muds & cuttings and other wastes, and comments on birds, polar bears and muskoxen. All subjects which I have not had time to cover today.

Thank you for allowing me to appear before you to discuss this most important issue.



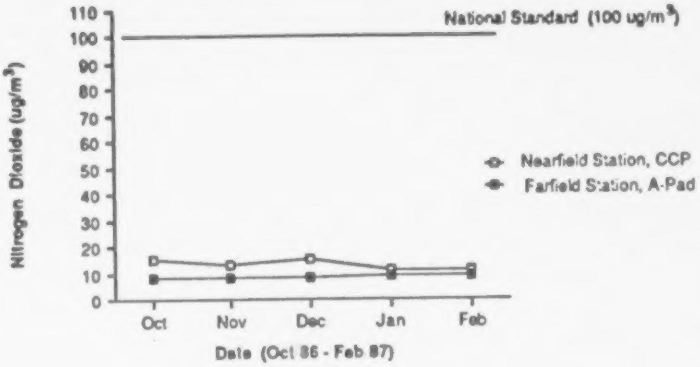
CANADIAN EXPLORATION ACTIVITY

0
100 miles
KAKTOVIK
ANWR COASTAL PLAIN
WILDERNESS
ARCTIC NATIONAL
AREA
WILDLIFE REFUGE
ARCTIC VILLAGE
NORTHERN YUKON NATIONAL PARK
HERSCHEL
OLD CROW FLATS
OLD CROW
RAMPARTS HOUSE
Porcupine
River
U.S.A.
CANADA
YUKON TERRITORY
NORTHWEST TERRITORIES
INUVIK
AKLAVIK
TUKTOYAKTUK
ARCTIC RED RIVER
FORT McPHERSON
Mackenzie River
TRADING POST
LITTLE CHICAGO
MARTIN HOUSE
EAGLE PLAINS
Peel River
Dempster Highway
YUKON FLATS
FORT YUKON
NATIONAL WILDLIFE REFUGE
Yukon River
CIRCLE
STEESE
NAT CONSV AREA
YUKON-CHARLEY RIVERS NATIONAL PRESERVE
EAGLE
DELTA JUNCTION
Alaska Highway
Taylor
TOK
TETLIN NWR
DAWSON
BEAR CREEK
GOOSEHIDE
MAYO
STEWART CROSSING
STEWART
Stewart River
Klondike
RANGE LIMIT OF PORCUPINE CARIBOU HERD
Oil or Gas Well
Oil or Gas Lease
Range Limit of the Porcupine Caribou Herd

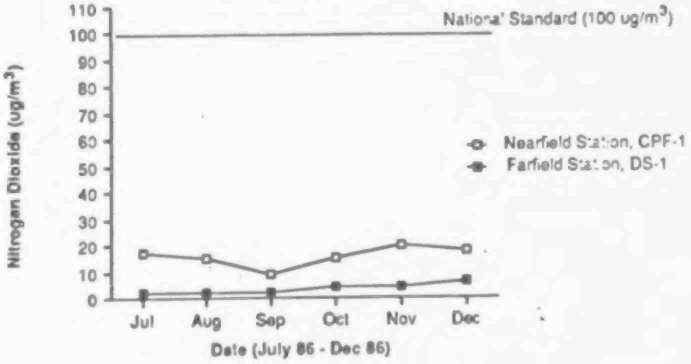
Range limits were generalized from the "ARCTIC NATIONAL WILDLIFE REFUGE COASTAL PLAIN RESOURCE ASSESSMENT, FINAL REPORT BASELINE STUDY OF THE FISH, WILDLIFE, AND THEIR HABITATS" December 1986

Lease and well information has been generalized from COGLA Exploration Agreement Map of April 1987

Prudhoe Bay Unit Mean Monthly Nitrogen Dioxide Values



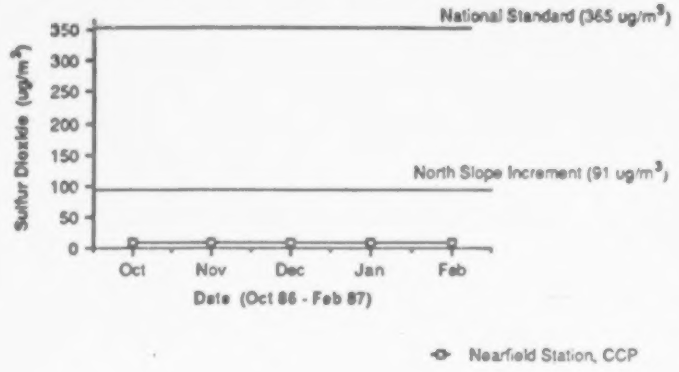
Kuparuk Unit Mean Monthly Nitrogen Dioxide Values



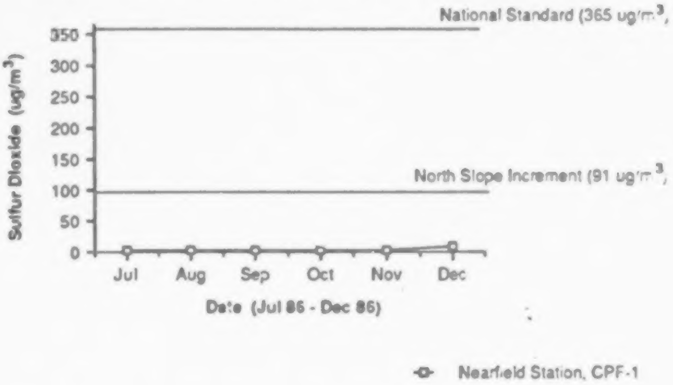
Note: The primary and secondary standards for nitrogen dioxide are identical. This standard is based on an annual average but is shown here against monthly values. In addition, incremental limits have not yet been established for nitrogen dioxide.

Source: ERT, 1987; ESE, 1986; and ESE, 1987

Prudhoe Bay Unit Maximum 24 -Hour Sulfur Dioxide Concentration

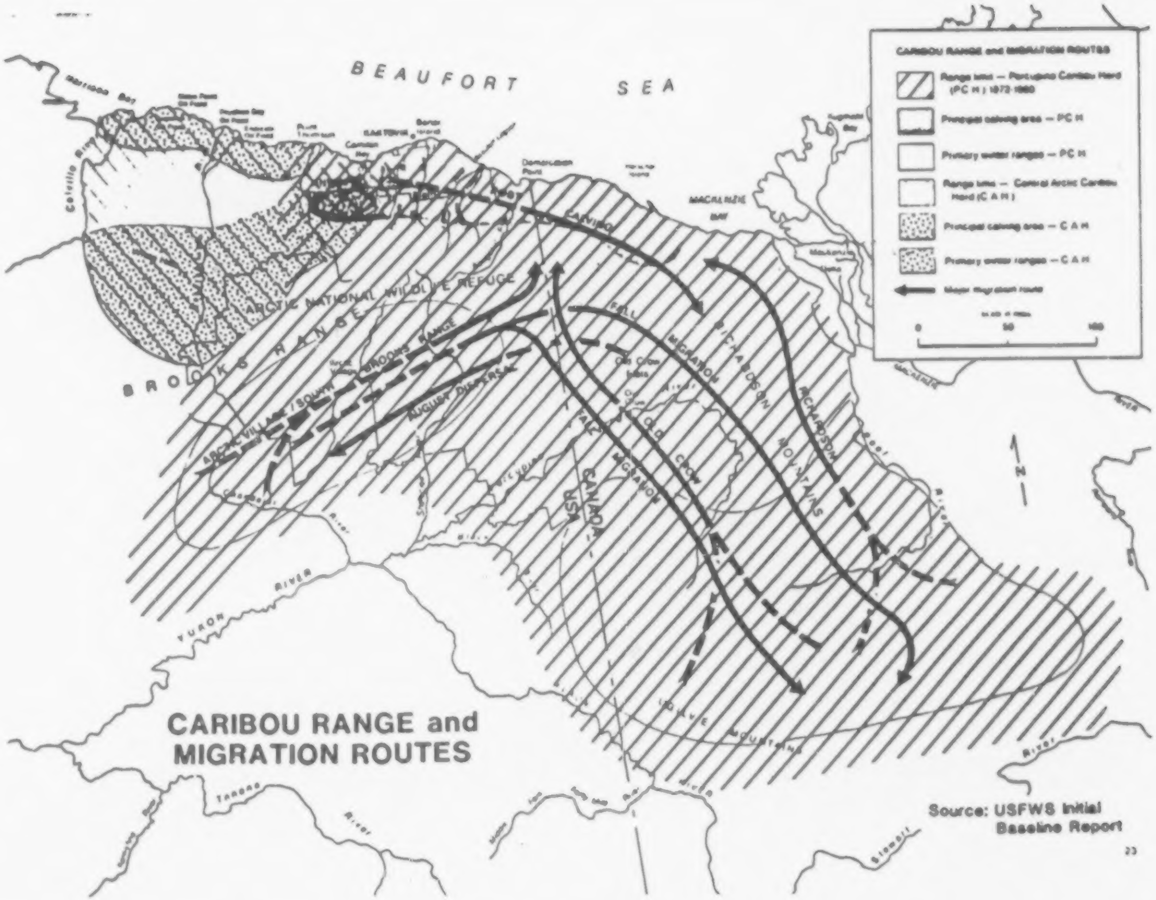


Kuparuk Unit Maximum 24-Hour Sulfur Dioxide Concentration



Note: There is not a 24-Hour secondary standard for sulfur dioxide.

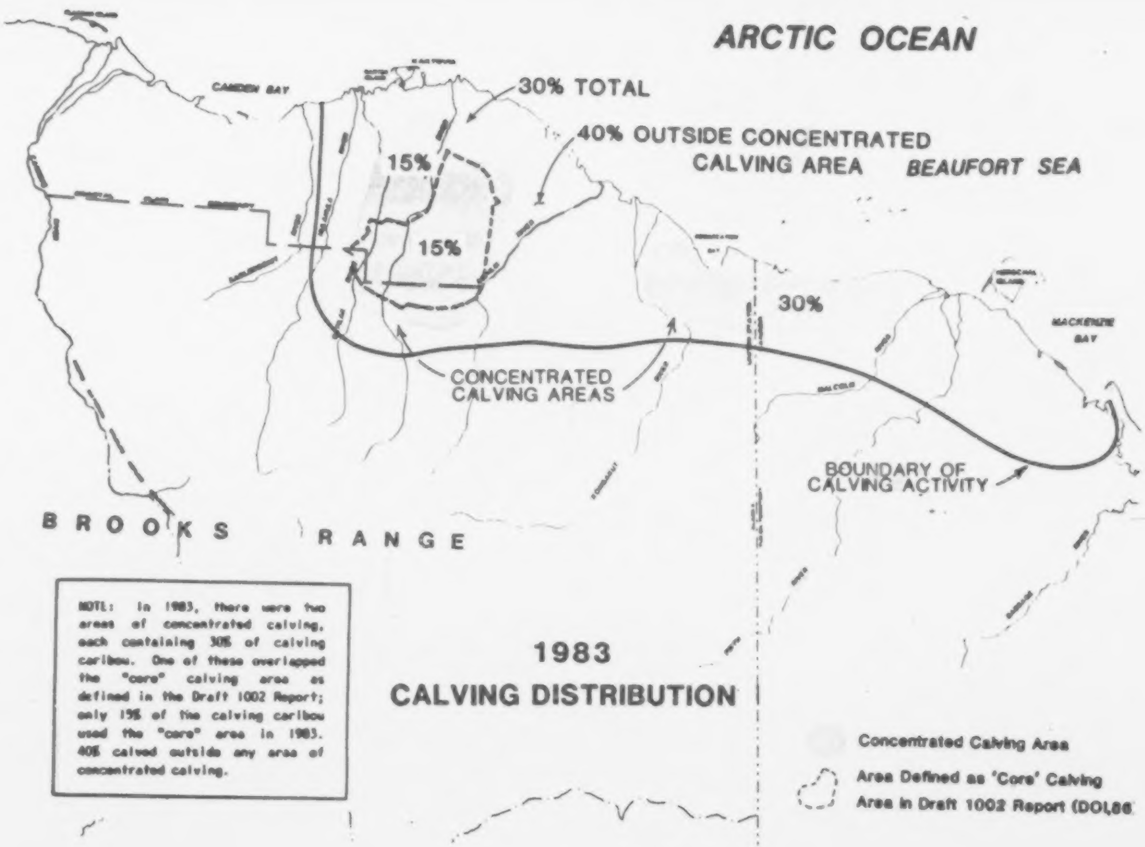
Source: ERT, 1987; ESE, 1986; and ESE, 1987


BEAUFORT SEA
CARIBOU RANGE and MIGRATION ROUTES
Range limit — Porcupine Caribou Herd (P C H) 1972-1980
Principal calving area — PC H
Primary winter ranges — PC H
Range limit — Central Arctic Caribou Herd (C A H)
Principal calving area — C A H
Primary winter ranges — C A H
Major migration route
0
50
100
N
MACKENZIE BAY
Demarcation Point
BROOKS RANGE
ARCTIC NATIONAL WILDLIFE REFUGE
RICHARDSON MOUNTAINS
OLD CROW
Old Crow
CANADA
USA
YUKON RIVER
OGILVIE MOUNTAINS
Colville River
Tanana River

CARIBOU RANGE and MIGRATION ROUTES

Source: USFWS Initial Baseline Report

23

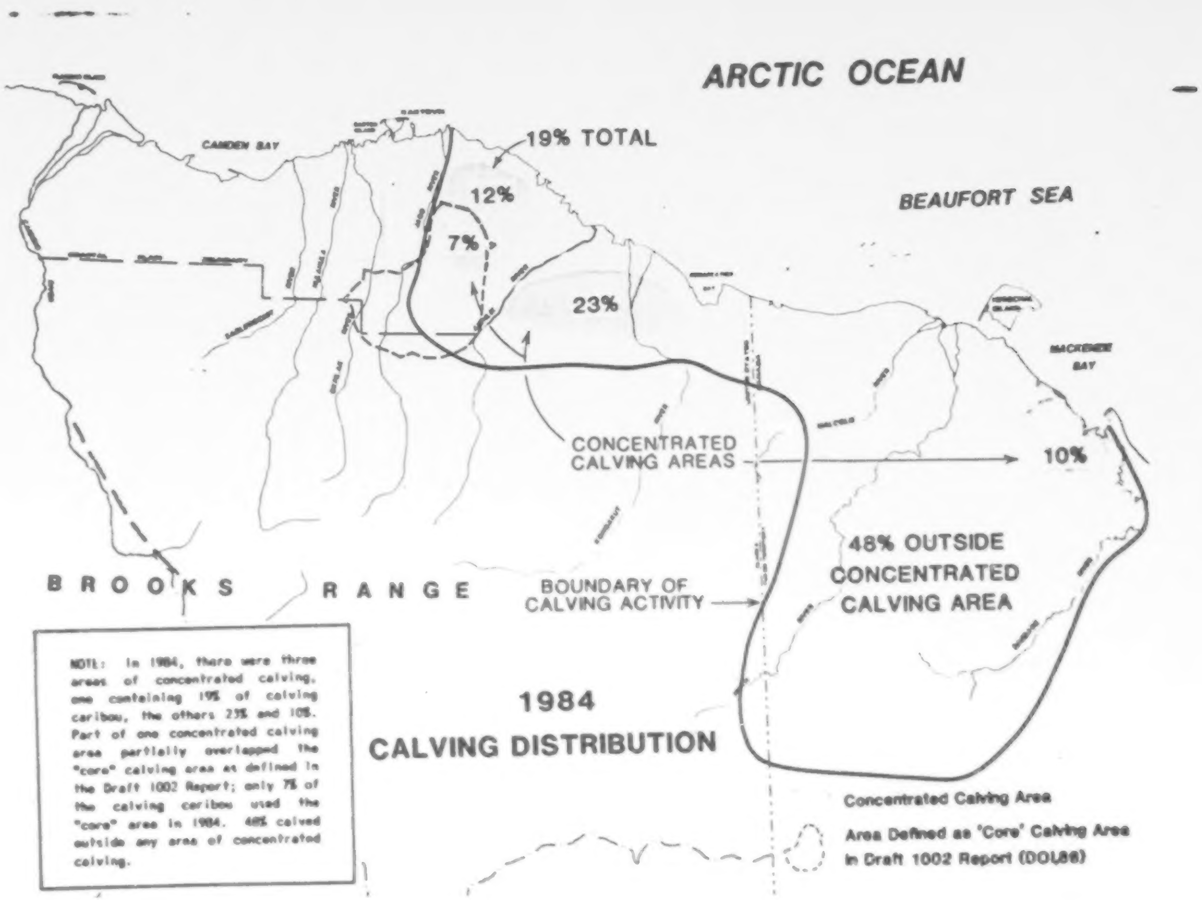


ARCTIC OCEAN
CAMDEN BAY
30% TOTAL
40% OUTSIDE CONCENTRATED CALVING AREA
BEAUFORT SEA
15%
15%
30%
MACKENZIE BAY
CONCENTRATED CALVING AREAS
BOUNDARY OF CALVING ACTIVITY
BROOKS RANGE
Concentrated Calving Area
Area Defined as 'Core' Calving Area in Draft 1002 Report (DOI,86

NOTE: In 1983, there were two areas of concentrated calving, each containing 30% of calving caribou. One of these overlapped the "core" calving area as defined in the Draft 1002 Report; only 15% of the calving caribou used the "core" area in 1983. 40% calved outside any area of concentrated calving.

1983

CALVING DISTRIBUTION


ARCTIC OCEAN
BEAUFORT SEA
CAMDEN BAY
MACKENZIE BAY
19% TOTAL
12%
7%
23%
10%
CONCENTRATED CALVING AREAS
48% OUTSIDE CONCENTRATED CALVING AREA
BOUNDARY OF CALVING ACTIVITY
BROOKS RANGE

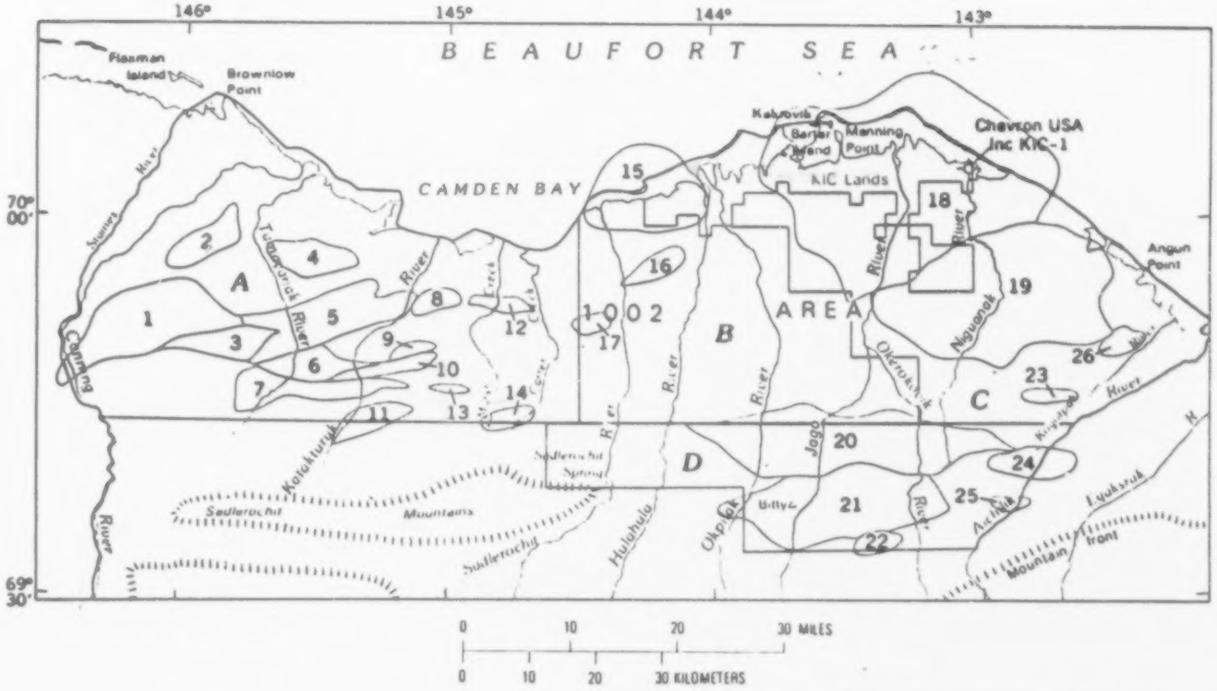
1984
CALVING DISTRIBUTION

NOTE: In 1984, there were three areas of concentrated calving, one containing 19% of calving caribou, the others 23% and 10%. Part of one concentrated calving area partially overlapped the "core" calving area as defined in the Draft 1002 Report; only 7% of the calving caribou used the "core" area in 1984. 48% calved outside any area of concentrated calving.

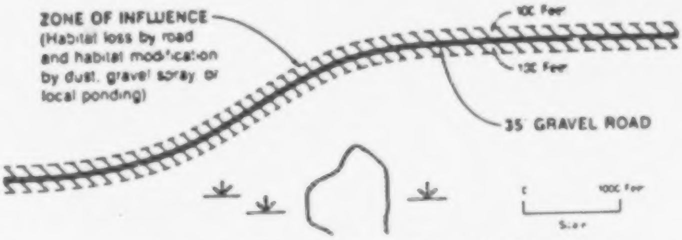
Concentrated Calving Area

Area Defined as 'Core' Calving Area in Draft 1002 Report (DOI,86)

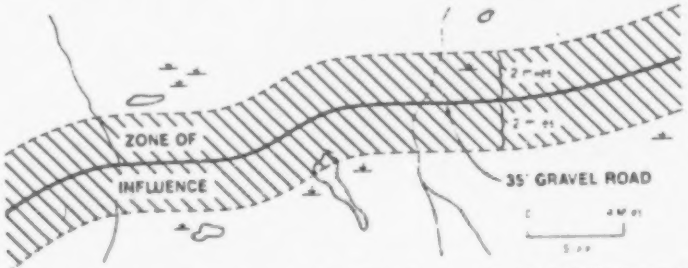
SEISMICALLY MAPPED PROSPECTS (1-26) AND RESOURCE BLOCKS (A-D) IN THE 1002 AREA


146°
145°
144°
143°
70° 00'
69° 30'
B E A U F O R T S E A
Flaxman Island
Brownlow Point
CAMDEN BAY
Kaktovik
Barter Island
Manning Point
KIC Lands
Chevron USA Inc KIC-1
Angun Point
1 0 0 2 A R E A
A
B
C
D
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
Staines River
Canning
River
Tamayariak River
Katakturuk
Sadlerochit
Mountains
Sadlerochit Spring
Hulahula
River
Okpilak
Jago
Niguanak
Okerokovik
Kingak
Aichilik
Egaksrak
Mountain front
0
10
20
30 MILES
0
10
20
30 KILOMETERS

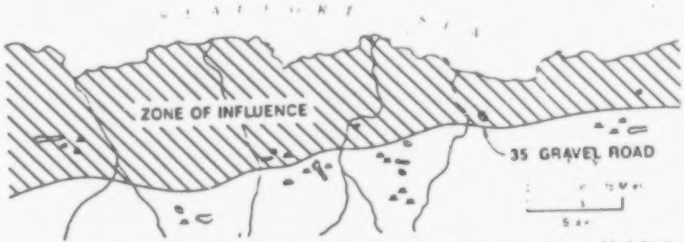
Source: Final 1002 Report, DOI, 1987


ZONE OF INFLUENCE (Habitat loss by road and habitat modification by dust, gravel spray or local ponding)
100 Feet
100 Feet
35' GRAVEL ROAD
0 1000 Feet
Scale

A. SITE-SPECIFIC: Habitat Loss or Modification
(Zone of influence is 235 ft. wide: 35-ft. road plus 100 ft. on each side)

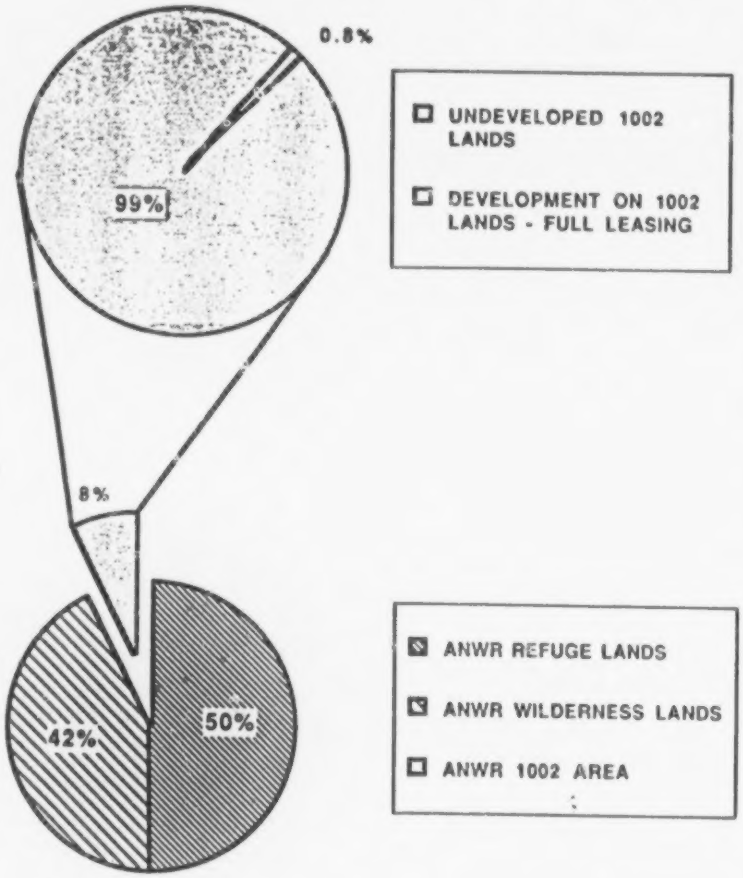

ZONE OF INFLUENCE
2 miles
2 miles
35' GRAVEL ROAD
0 4 Miles
Scale

B. IMMEDIATE VICINITY: Hypothetical Displacement of Wildlife from Habitat
(Zone of influence is approximately 2 miles on each side of road)

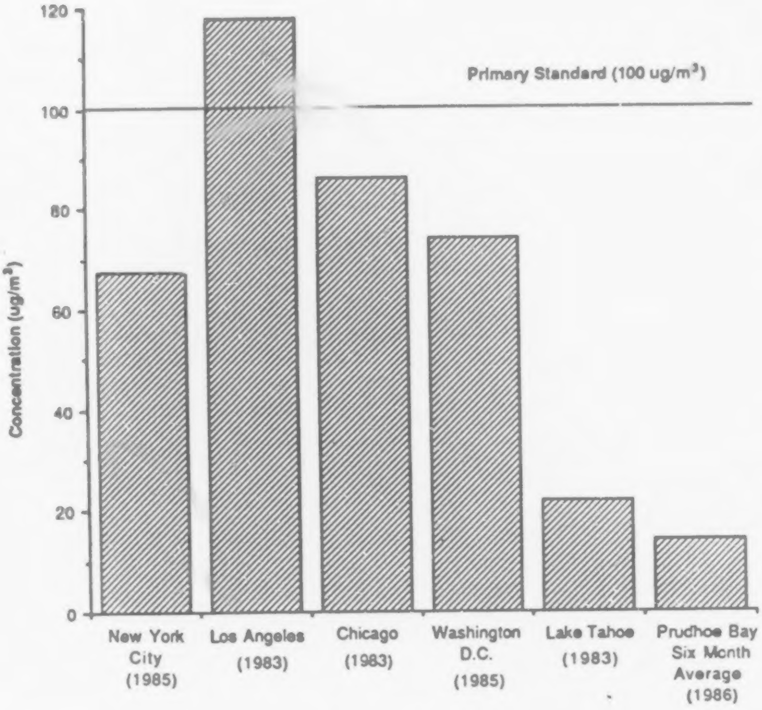

BEAUFORT SEA
ZONE OF INFLUENCE
35' GRAVEL ROAD
Scale

C. REGIONAL: Hypothetical Blockage of Wildlife from Habitat
(Zone of influence includes all land on one side of road)

HYPOTHETICAL ZONES OF INFLUENCE (ACCORDING TO DOI 1987)

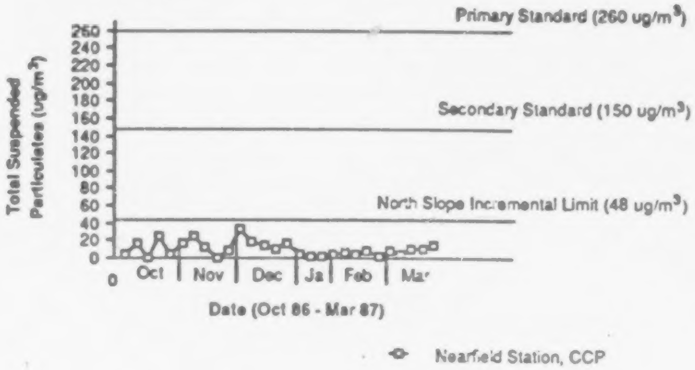


ANWR LAND USE

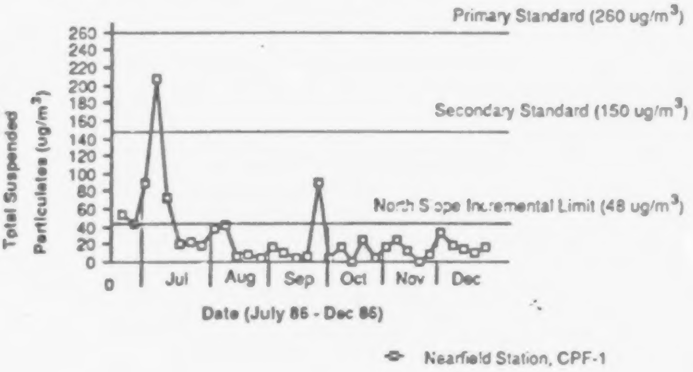


Annual Ambient Nitrogen Dioxide Concentrations

Prudhoe Bay Unit Maximum 24-Hour Particulate Concentrations



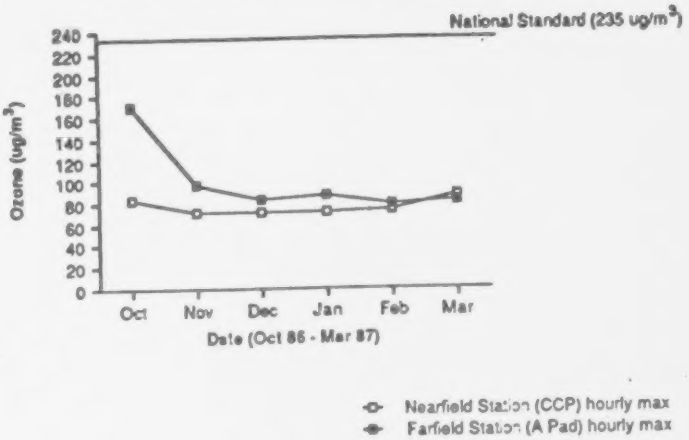
Kuparuk Unit Maximum 24-Hour Particulate Concentrations



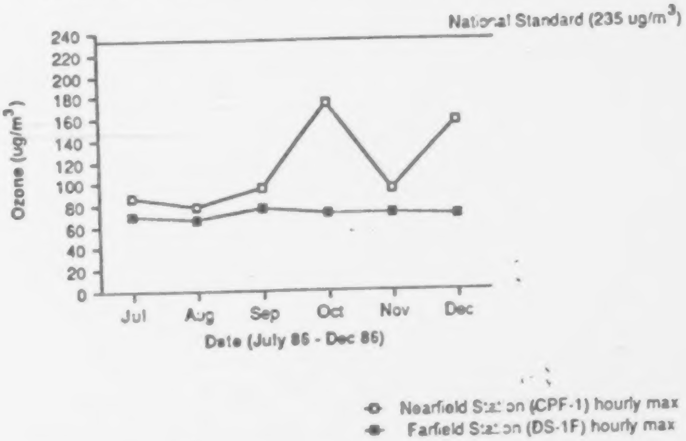
Note: Exceedances of the North Slope incremental limit are due to wind blown dust. There are not large contributions of particulates from equipment operated at Prudhoe Bay production facilities. In fact after September, when snow covers the area, there were no exceedances of the incremental limit.

Source: ERT, 1987; ESE, 1986; and ESE, 1987

Prudhoe Bay Unit Maximum 1- Hour Ozone Concentrations



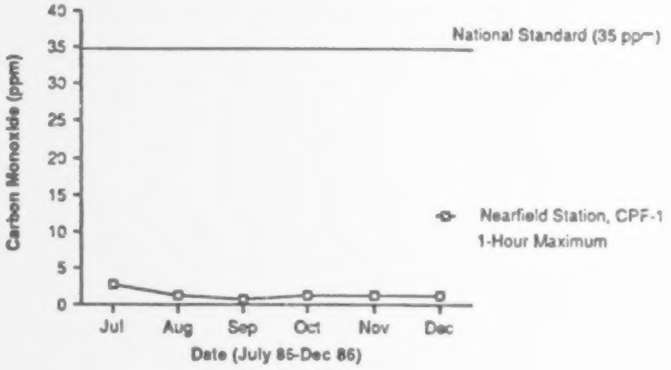
Kuparuk Unit Maximum 1-Hour Ozone Concentrations



Note: The primary and secondary standards for ozone are identical. In addition, incremental limits have not yet been established for ozone.

Source: ERT, 1987; ESE, 1986; and ESE, 1987

Kuparuk Unit Maximum Hourly Carbon Monoxide Concentrations



Note: The primary and secondary standards for carbon monoxide are identical. In addition, incremental limits have not yet been established for carbon monoxide.

Source: ERT, 1987; ESE, 1986; and ESE, 1987

The CHAIRMAN. Thank you very much indeed. Next we will hear from Mr. James Weeks, manager of Prudhoe Bay field operations. Oh, excuse me, Dr. Maki.

STATEMENT OF DR. ALAN W. MAKI, SENIOR ENVIRONMENTAL SCIENTIST, EXXON CO., U.S.A.

Dr. MAKI. Good morning. My name is Dr. Alan Maki, and I am the senior environmental scientist with Exxon Company U.S.A. in Anchorage.

My Ph.D. is in wildlife and fisheries management, and I have authored or co-authored some 60 papers and six books having to do with various aspects of environmental quality and industrial development.

I am currently the chairman of the Alaska Oil and Gas Association's Caribou Task Force, and the Biological Resources Subcommittee of the Alaska Oil and Gas Association. I would like to talk with you this morning a few points on caribou biology.

I would like to emphasize a couple of the key fundamental issues from the standpoint of actual science of wildlife biology, to get an understanding of the actual population demographics of the Central Arctic Herd and the Porcupine Herd in northern Alaska, so that by understanding the fundamental tenets of this wildlife biology and the population demographics, we can thereby divorce some of the emotionalism that has begun to color the issue and hopefully provide a basis for you to establish a truly science-based policy regarding the management of both ANWR's renewable and non-renewable resources.

The first issue I think, the point to be made has to do with caribou habitat. Return with me, if you will, to Wildlife Biology 101, that course wherein all prospective wildlife biologists are taught that carrying capacity of habitat is the fundamental relationship to keying the size of population growth and the ultimate size of a population.

Carrying capacity defines the number of animals that a particular habitat will support, from a standpoint of food and space resources. It seems that these fundamental relationships have been neglected in much of the discussion to date regarding impacts.

I would like to show you how I think they should be properly applied. We have known for some time now, actually I can quote as far back as the mid-1960s wherein——

Senator MURKOWSKI. Mr. Chairman, I wonder if the witness could speak a little closer to the microphone. I am having a difficult time hearing.

Dr. MAKI. Okay. Is that better, sir? In the late 1960s, the former Alaska Department of Fish and Game Commissioner Skoog looked at very closely the relationships between habitat, range carrying capacity, and the Alaskan caribou herds.

It was his conclusion, after looking through the available information and field studies, that the range carrying capacity and total habitat had never been fully occupied within the State of Alaska.

Subsequent data that we have evolved since that time period tends to underscore that information. In the mid-1970s the University of Alaska researchers, in a detailed bio-energetic study, looked at both laboratory and field data, and came up with conclusions that the Central Arctic Caribou Herd in the Prudhoe Bay summer range consumed somewhat less than 1 percent of the available forage during the 50 day summer period that they are on the Coastal Plain.

The conclusion from this type of data very clearly is that neither food quality nor quantity are limiting the growth of caribou populations during their summer range on the Coastal Plain.

So, how large then can we expect caribou populations really to grow? This is a very subjective question. Much information has to rely on modeling predictions, modeling projections.

In 1978, during a workshop at the University of British Columbia, the dynamics of the Porcupine Herd were modeled. At that time, the size of the herd was about 110,000 animals. Currently there are in the vicinity of 180,000.

The results of that simulation model indicated that the herd would not be limited by winter food supplies until they approach something of the order of 1 million animals.

The simulation also indicated that if no animals crossed the Dempster Highway, this is a highway in the Yukon, the entire range east of the road in the Ogilvie Mountains was lost, the herd would still prosper, if food resources were the only consideration.

Therefore, it is important to remember that habitat, food availability, whatever parameter you want to look at during the summer range on the Coastal Plain, does not limit the size of the herd.

Therefore, if you share the analogy with me of a pie, what we are looking at in the Central Arctic Herd, and proposing also in the Coastal Plain of ANWR, is to take a slice of that pie.

We have indeed left a footprint on the Coastal Plain. We have produced a subtle displacement of these animals. There is no question that the herd does not utilize portions of the downtown Dead Horse-Prudhoe Bay area to the same degree that they did in the past.

However, the key point to not lose sight of is that that Central Arctic Herd has continued to prosper and continued to thrive because there is ample food resource, ample habitat available for their continued growth and survival.

So this concept of pie is I think very useful. We are proposing to take a slice of that pie, but there is still ample pie to go around to ensure the continued growth and survival of that herd considerably beyond their existing size.

Senator BRADLEY. Did they cross the highway?

Dr. MAKI. Yes. I will get into that in a little bit. The issue of caribou calving habitat has become a major topic of discussion.

We have heard much about the concept of "core calving area" and its importance to the relative growth of the herd. I feel it is an unfortunate use of terminology in that the way it has been espoused is that it has become as a shrine, that caribou must return to.

And if for some reason they do not return to this mecca every spring, the herd will not continue to thrive. But when we begin to look at the actual distribution in annual calving history, you find a considerably different story.

As you see in some of the figures I submitted with my testimony, I have picked just a few years of the calving distribution. We have detailed field surveys since approximately 1972 of the calving habitat for the Porcupine Herd.

The conclusion, after looking through these data, from 1972 to the present, is very clearly that the calving habitat is more properly represented as a continuum across the North Slope.

When you look at the distribution of calving, you clearly see that it has occurred from as far east as the Babbage River in Canada all the way over historically to the Canning River, which forms the western border of ANWR.

And over these past 15 or 16 years for which we have ample data, that this continuum has been utilized one year to one degree or another to a certain degree. We really have not got a good fix on what defines adequate calving habitat.

We, I say, the community of caribou biologists, caribou researchers, are looking at what defines calving habitat. We find that it is a combination of rather subjective elements. It appears very definitely weather-related.

Also it appears that caribou have recognized during the eons through their evolution that there is a distance survival advantage to dropping your calves in the Coastal Plain area, away from the treeline and the foothills, which at that time also serve as denning areas for wolf populations.

We know that the wolves are very predator pressure, and do indeed influence the growth of caribou herds. So the caribou have recognized over the eons as an adaptive survival mechanism to have your calves away from the foothills where wolves are denning, is a distance advantage, because the wolves are having their pups at the same time. They have a limited hunting range that they can travel.

There is also a distinct micro-habitat advantage to having your calf in an area of windswept slopes where there is a minimum of snow cover. Apparently there is a protective coloration value for protection against rapters. These are some of the golden eagles, which can also exert a predatory pressure on caribou calving.

So it is a combination of these subjective micro-habitat issues that we think define why caribou calve where they do. But you can see the parameters of calving habitat. Windswept slopes, or snow-free areas, away from foothills and treelines.

There is nothing overly-distinctive about those type of requirements in that those requirements are indeed meant as a true continuum across the North Slope in that there is considerable habitat available for them to continue calving and continue their growth.

I would like to share with you also some of the experience from other caribou herds. We have considerable information available for other herds regarding human interaction and direct interactions of limited development with the Porcupine Herd.

For example, the Delta Herd is another herd in Alaska. The Alaska Department of Fish and Game has studied this herd in some detail. Some of their conclusions I will share with you here now.

The Delta Caribou Herd has been exposed to more disturbance than any other Alaskan caribou herd, as a result of military activity in and around their direct range. The conclusions from the Fish and Game study are as I quote here:

> We observed no adverse effects on productivity, indicating that caribou are more plastic in their selection of calving habitat than previously recognized. Major highways and railroads on or near the herd's boundaries also apparently are not important limiting factors.

So the conclusion of the study, then, that high levels of habitat disturbance have been of minor importance as limiting factors to that particular Delta Herd.

Now, regarding direct experience with the Porcupine Herd, I would like to talk with you about some results of a study done by Dr. Tom Bergerud of the University of Victoria in British Columbia back in 1984.

He looked at the herd in the area of the Dempster Highway in the northern Yukon. This highway has literally bisected portions of the winter range of the herd in the northern Yukon.

In 1976 new construction of this highway transacted major spring migration corridor in the northern Richardson Mountains. The highway was completed in 1978. At that time, a 5 mile no-hunting corridor was established along the highway.

Very clearly, the Porcupine Herd continues to cross that highway on a regular basis during their annual migrations. So if the highway has not indeed caused any major problem, with respect to migration of large numbers of the herd.

So it is clear when you look at the entire body of scientific data, that the developmental impacts, we can really look at, and I think provide support to the Secretary's recommendation from the 1002 report.

As you well know, his statement is,

> Based on demonstrated success at Prudhoe Bay and elsewhere, that oil and gas activities can be conducted in the 1002 area in a manner consistent with the need and desire to conserve the area's significant environmental values.

I would like to point out that jointly the industry and regulatory agencies have expended literally millions of dollars and hundreds of man-years of research effort to describe the wildlife, specifically the caribou populations in and around the North Slope.

This effort has led to an excellent understanding of the impacts of oil field development, and the development of tried and proven mitigation techniques to ensure the compatibility of wildlife and oil field interests.

Therefore, we clearly do not feel that any delay in exploration and development to gather additional biological data on calving frequency or calving distribution is either necessary or justified in light of the preponderance of available information.

I would like to close by pointing out, as we heard again yesterday, that all of the environmental activists unwarranted predictions of 15 years ago, prior to the construction of TAPS and the Prudhoe Bay facility, have subsequently been proven false.

The demise of major caribou herds and major losses of habitat simply have not occurred. Conversely, the development of Prudhoe Bay and TAPS have allowed a period of economic prosperity and harmony with a high quality environment and thriving caribou populations.

I thank you for the opportunity to present these views. And I am certainly available for questions you might have.

[The prepared statement and a subsequent submittal by Dr. Maki follow:]

Statement for Senate Energy and Natural Resources Committee on ANWR

Friday, June 12, 1987
Washington, D.C.

My name is Dr. Alan W. Maki and I am the Senior Environmental Scientist for Exxon Company, U.S.A. in Anchorage, Alaska. My Ph.D. is in Wildlife and Fisheries Management and I have authored or co-authored over 60 papers and six books on numerous aspects of environmental quality and industrial development. I am currently chairman of the Caribou Task Force and the Biological Resources Subcommittee of the Alaska Oil and Gas Association. Today I am speaking on behalf of Exxon Company, U.S.A.

The issue of potential exploration and development impacts on wildlife resources and specifically the Porcupine Caribou Herd in ANWR has rightfully become a topic of concern to the state of Alaska, the environmental community, and the industry. I would like to discuss the issue from a standpoint of the science of wildlife biology and caribou population demographics in order to divorce the emotionalism from the issue and focus on the development of a science-based policy for the management of both ANWR's renewable and non-renewable natural resources. I would also like to discuss our concerns with the habitat-based approach to impact assessment proposed by the U.S. Fish & Wildlife Service. We believe a population based approach to caribou impact assessment is more biologically sound, and we firmly believe that there are adequate data available to support full access to the Coastal Plain as provided for in Alternative A of the 1002 report with confidence that biological resources will be protected.

Caribou Habitat

Much discussion has centered on research on the behavior and movements of caribou in and around oil field development. The main problem with these discussions, and the conclusions drawn, is that they focus on habitat and do not consider the fact that habitat is not limiting caribou population growth for any Alaska herd, including the Porcupine Caribou Herd. Therefore, conclusions regarding displacement of maternal cows or bulls carry little, if any, significance for the continued growth and survival of the herd. Since habitat is not limiting, loss of access to small portions of abundant habitat due to oil field development is not biologically significant.

In the management of wildlife populations, the concept of habitat carrying capacity is the key to defining management goals for a herd. It is an established fact that neither the Central Arctic Herd (CAH), which calves around the Prudhoe Bay/Kuparuk complex, nor the Porcupine herd approach the carrying capacity of their ranges. Indeed, former Alaska Department of Fish and Game Commissioner Skoog stated in his 1968 thesis that "It seems likely that the Alaskan caribou population has remained far below range carrying capacity and that the total habitat has never been fully occupied. In reality caribou populations seem to have maintained densities much lower than the maximum dictated by food alone, and hence the reduction in total range becomes less meaningful."

The dynamics of the Porcupine Herd were modeled in a workshop at the University of British Columbia in 1978 when the herd numbered 110,000. The simulation model indicated that the herd would not be limited by winter food supplies until the herd reached about one million animals. The simulation also indicated that if no animals crossed the Dempster Highway and the entire range east of the road in the Ogilvie Mountains was lost, the herd could still prosper if food resources were the only consideration. Thus, we agree with Skoog's conclusion that habitat is not currently limiting the growth of the Porcupine Caribou Herd and believe these data support our position that the small loss of habitat represented by likely development in the 1002 area will not impact growth or productivity of the Porcupine Caribou Herd.

Caribou Calving Habitat

The "core calving area" concept has received much discussion relative to the ANWR issue. Such an area has been assumed to be critical to PCH demographics and, therefore, any displacement from this area would necessarily impact productivity. In fact, the historical data for calving distribution do not support fidelity to a "core calving area." These data clearly show that calving has occurred on the coastal plain from the Babbage River in Canada, which is 120 miles to the east of the 1002 area, to the Canning River, which is the western boundary of the 1002 area. Thus, calving habitat is more correctly referred to as a continuum across the coastal plain rather than a specific core area. (Figures 1-4 attached)

Also, wide year-to-year variations in calving distribution have occurred due to weather influences and the arrival of spring snow-melt. This effect of weather further erodes the core-calving area concept and points out the wide annual variability and adaptability of caribou.

It is important to understand that the PCH has successfully calved over a very large area in the past and while a concentrated calving area is obviously important to the herd, it is neither critical nor fixed.

Experience with other Caribou Herds

Much has been said and written about the individual nature of the PCH and its comparability with the CAH. I would like to point out that the scientific literature documents numerous other examples of caribou herds and human disturbance and I would like to share some of these examples with you to underscore the extremely adaptable nature of this species.

Detailed studies of the Delta Caribou Herd were conducted by Alaska Department of Fish and Game from 1969 to 1983. The DCH ranges over approximately 9600 square kilometers on the north slope of the Alaska Range between the Nenana River in the west and Delta River on the east.

The following quotes the ADF&G author's conclusions from the study as published by Davis et al. (1985). "The Delta Caribou Herd has been exposed to more disturbance than any other Alaskan caribou herd. Frequent bombing, strafing, artillery firing, and low-level overflights by military and civilian aircraft have occurred on traditional calving areas and adjacent ranges. Calving success was apparently not adversely affected by exposure to dense wildfire smoke during calving in 1979 and 1983 and selection of a 3-year-old burn for calving in 1982. Despite these disturbances and others, the herd has increased at an annual rate of 19-22% since 1976 and is now larger than ever recorded. We infer from these and other observations that the Delta Caribou Head is reasonably adaptable to a wide range of 'significant disturbances.'

We observed no adverse effects on productivity indicating that caribou are more plastic in their selection of calving habitat than previously recognized. Major highways and railroads on or near the herd's boundaries also apparently are not important limiting factors.

In conclusion, high levels of sensory and habitat disturbance have been of minor importance as limiting factors. In contrast, Davis et al. (1983) showed that harvest and predation by wolves were major limiting factors prior to 1976."

Published data also exist on the interaction of the PCH with newly developed roads. Bergerud et al. (1984) stated that "Since the late 1960s construction of the Dempster Highway has bisected portions of the winter range of the herd in northern Yukon. In 1976 new construction transected a major spring migration corridor in the northern Richardson Mountains. The highway was completed in 1978, and at that time a five-mile no-hunting corridor was established along the highway. Crossing of the highway by caribou and use of winter ranges south of the highway have continued to the present time."

Conclusion

Thus it is clear that when the entire body of scientific data summarizing caribou and developmental impacts is considered we can indeed support the conclusion of the 1002 report which states "Based on demonstrated success at Prudhoe Bay and elsewhere, that oil and gas activities can be conducted in the 1002 area in a manner consistence with the need and desire to conserve the area's significant environmental values." Jointly, the industry and regulatory agencies have expended literally millions of dollars and hundreds of man-years effort to characterize the interaction of fish and wildlife with the oil field development in and around the Prudhoe Bay area. This effort has led to an excellent understanding of the impacts of oil field development and to the development of tried and proven mitigation techniques to ensure the compatibility of wildlife and oil field interests.

Thus we do not feel that any delay in exploration and development to gather additional biological data on calving frequency and distribution is either necessary or justified in light of the preponderance of available information.

Indeed, we would like to point out that all of the environmental activists' unwarranted predictions of 15 years ago, prior to the construction of TAPS, have subsequently been proven false. The demise of major caribou herds and major losses of habitat simply have not occurred. Conversely, the development of Prudhoe Bay and TAPS have allowed a period of economic prosperity in harmony with a high quality environment and thriving caribou populations.

Thank you for the opportunity to present our views.

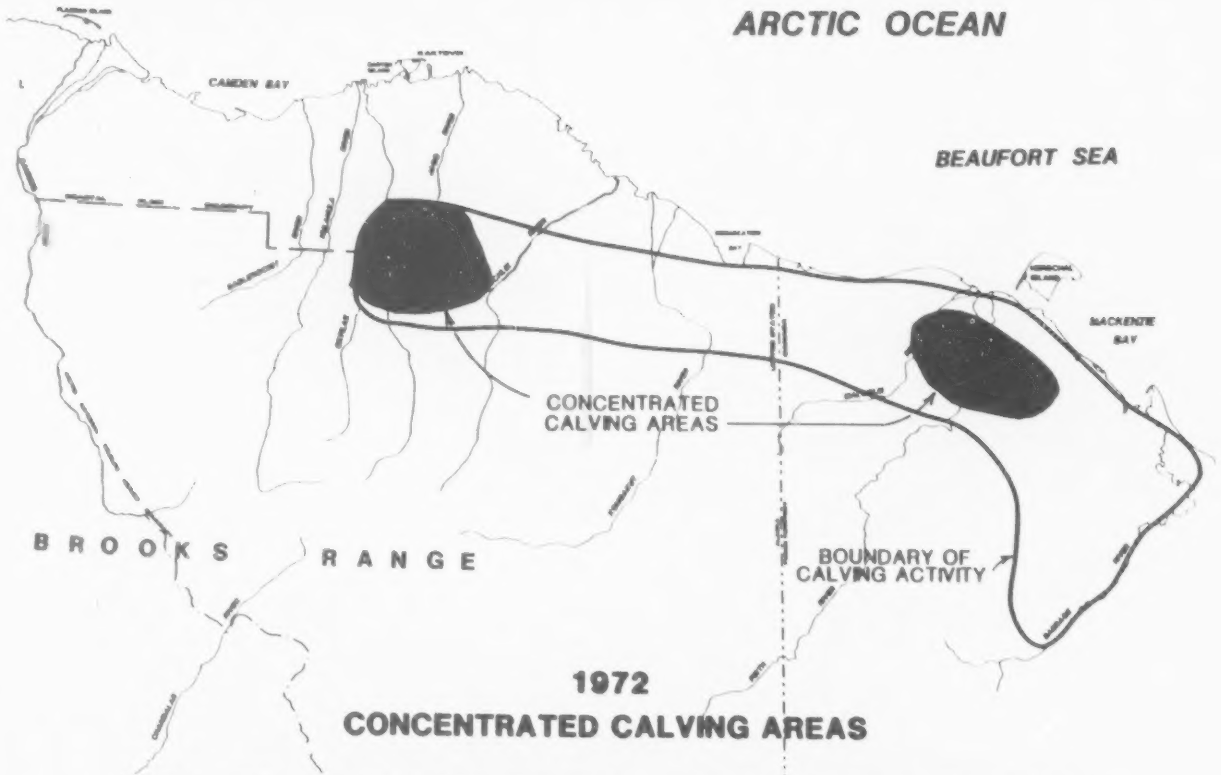

ARCTIC OCEAN
BEAUFORT SEA
CAMDEN BAY
MACKENZIE BAY
CONCENTRATED CALVING AREAS
BOUNDARY OF CALVING ACTIVITY
B R O O K S   R A N G E
1972
CONCENTRATED CALVING AREAS

Figure 1. Areas of concentrated and general calving activity of the Porcupine Caribou Herd by year, 1972-1985. Solid areas were identified as being used by 'concentrations' of calving caribou; the solid line marks the boundary of calving activity. Note the large amount of annual variability in the location of concentrations of calving caribou. In some years (1973 and 1980) no calving concentrations were observed. [Based on data provided by D.G. Roseneau (1972-1981) and by U.S. Fish and Wildlife Service (1982-1985)].

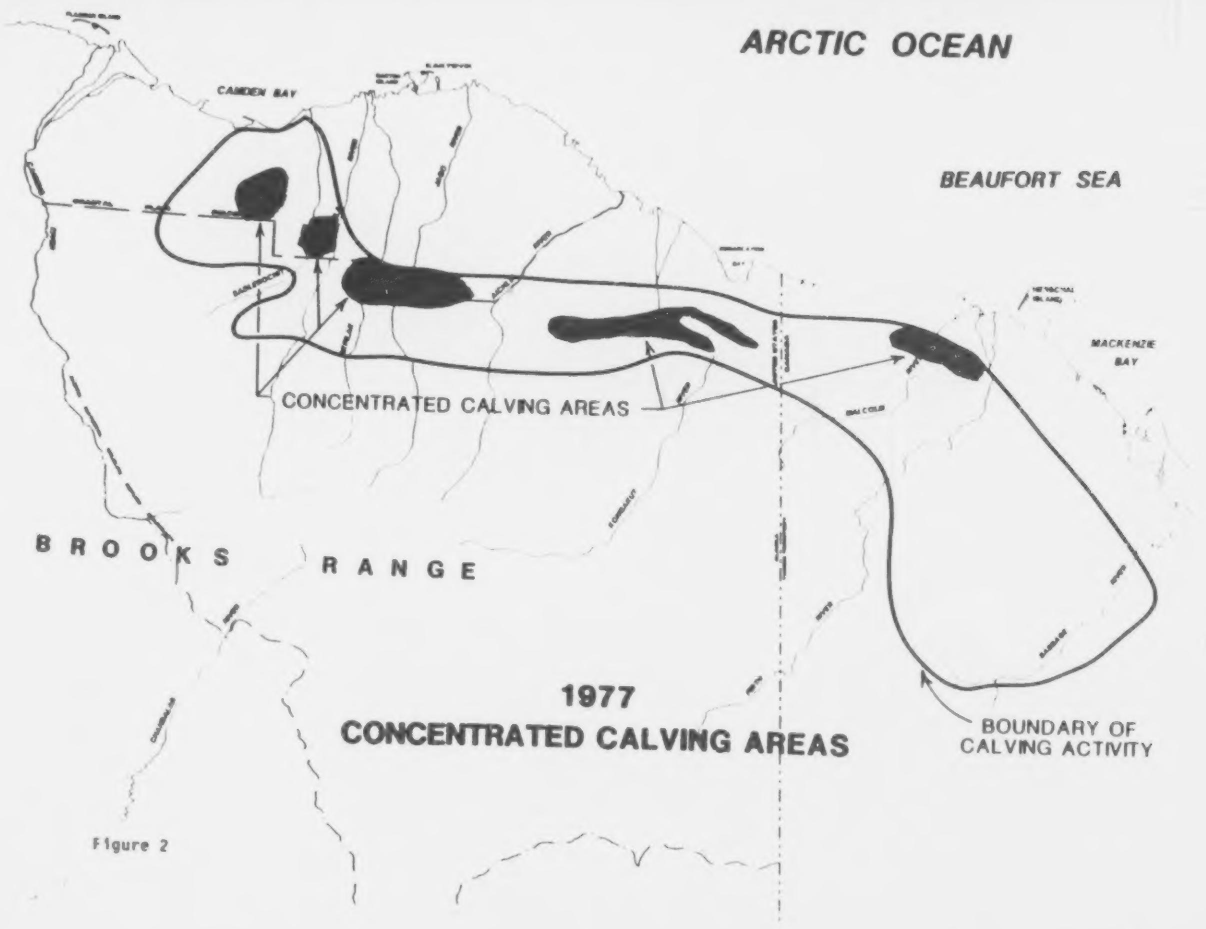
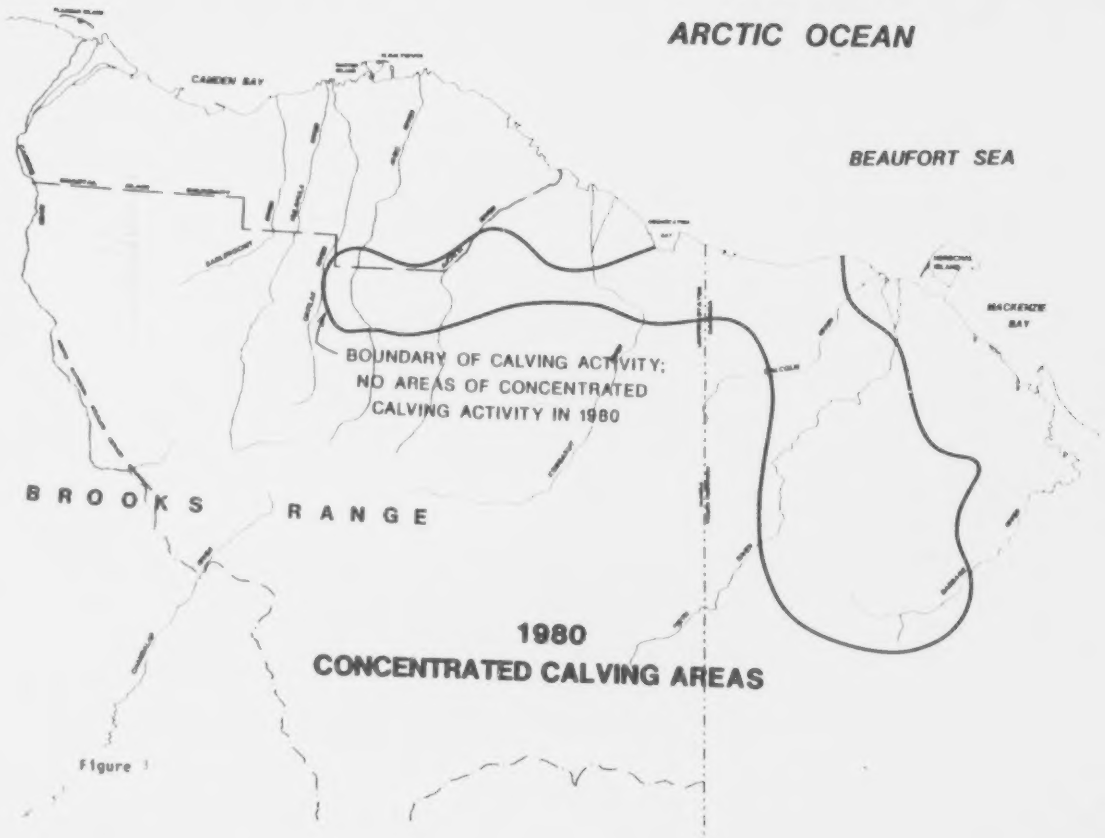

ARCTIC OCEAN
BEAUFORT SEA
CAMDEN BAY
MACKENZIE BAY
CONCENTRATED CALVING AREAS
BROOKS RANGE
1977
CONCENTRATED CALVING AREAS
BOUNDARY OF CALVING ACTIVITY

Figure 2



ARCTIC OCEAN
BEAUFORT SEA
CAMDEN BAY
MACKENZIE BAY
BROOKS RANGE
BOUNDARY OF CALVING ACTIVITY; NO AREAS OF CONCENTRATED CALVING ACTIVITY IN 1980

1980
CONCENTRATED CALVING AREAS

Figure 1

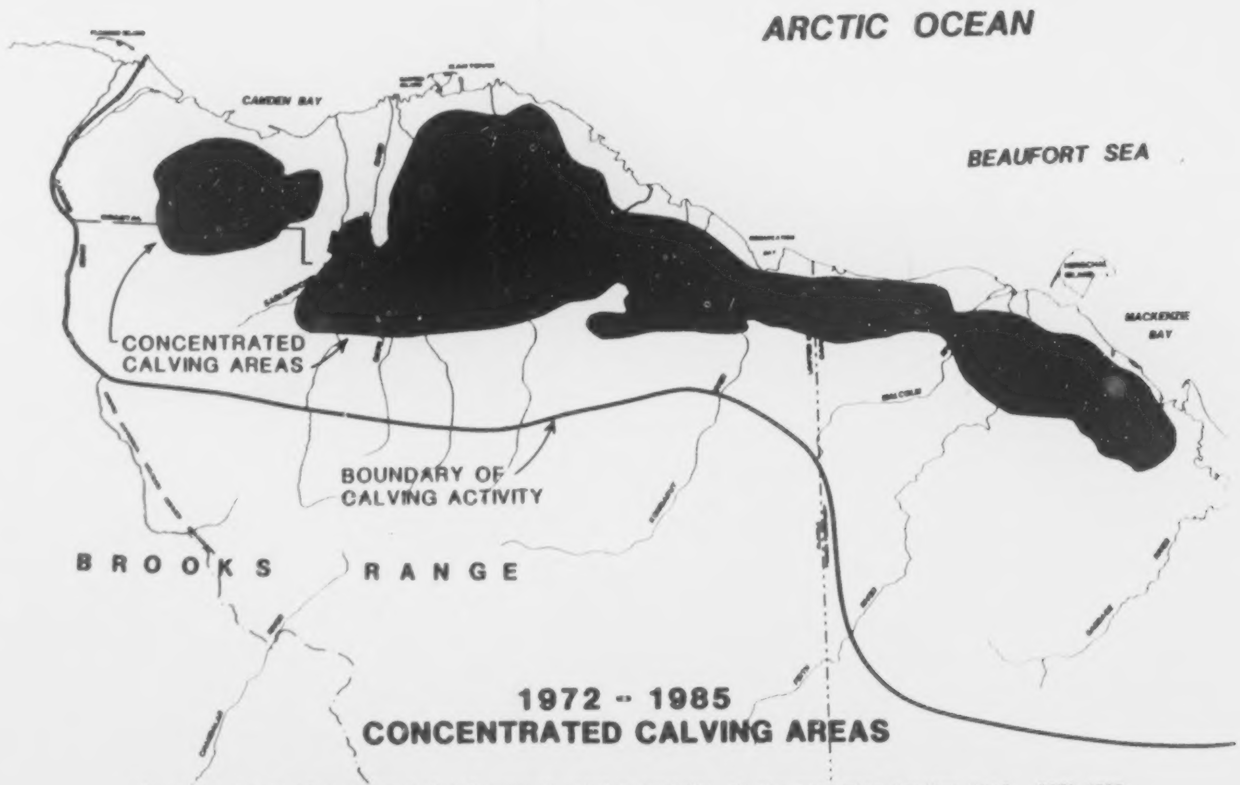

ARCTIC OCEAN
BEAUFORT SEA
CAMDEN BAY
MACKENZIE BAY
CONCENTRATED CALVING AREAS
BOUNDARY OF CALVING ACTIVITY
BROOKS RANGE
1972 - 1985
CONCENTRATED CALVING AREAS

Figure 4. Areas of concentrated and general calving activity of the Porcupine Caribou Herd, 1972-1985. Solid areas were identified as being used by 'concentrations' of calving caribou in at at least one of 14 years; the solid line marks the approximate boundary of calving activity during the same period. Note that concentrated calving takes place in a broad area extending about 200 miles from east to west and from the foothills to near the coast. See Figure 2 for yearly patterns. [Based on data provided by D.G. Roseneau (1972-1981) and by U.S. Fish and Wildlife Service (1982-1985)].

EXXON COMPANY, U.S.A.
POST OFFICE BOX 196601 • ANCHORAGE, ALASKA 99519-6601

June 24, 1987

The Honorable J. Bennett Johnston, Chairman
Senate Energy and Natural Resources Committee
Washington, D.C. 20510

Dear Senator Johnston:

As a follow-up to the testimony presented before your Committee on Energy and Natural Resources during the Arctic National Wildlife Refuge hearing of June 12, 1987, Exxon Company, U.S.A., would like to submit the attached information to be included with the formal hearing record.

The attached pages detail additional biological information and background data concerning caribou and brown bear populations on the North Slope about which you and the committee members inquired. I trust you will find these materials of interest and, again, I appreciate the opportunity to have appeared before your committee. Should you have further questions regarding fish and wildlife populations on Alaska's North Slope, please don't hesitate to contact me.

Thank you,

Alan W. Maki

A. W. Maki Ph.D.

AWM/cjs/498
Attachment

A DIVISION OF EXXON CORPORATION

Senate Energy and Natural Resources Committee
hearing on the Arctic National Wildlife Refuge, June 12, 1987
Supplementary Information
Exxon Company, U.S.A - June 24, 1987

1. What is the history of caribou calving and movements within the Prudhoe Bay and Kuparuk oilfields? Has the frequency/intensity of calving in these areas been influenced by development of the oilfields?

Response: Prior to approximately 1960, calving in the Prudhoe Bay area does not appear to have involved large numbers -- ie. no more than a few hundred animals. Oilfield development has likely resulted in a subtle displacement of some Central Arctic caribou, however since ample calving habitat remains, the herd continues to prosper. Further detail follows.

The qualitative field observations of Angus Gavin provide the most accurate data for the early history of calving in the Prudhoe Bay area. His data represent the best available information for the 1970-79 period. These data, as shown in Figure 1, demonstrate that calving habitat is a true continuum across the study area. The darkest stipling is designated "major calving areas" however the term is not quantitatively defined nor are specific densities reported. The lighter stipling represents post-calving distribution and summer range. The horizontal bar in the Brooks Range foothills represents calving distribution during late springs with deep snows on the coastal plain (Gavin, 1979).

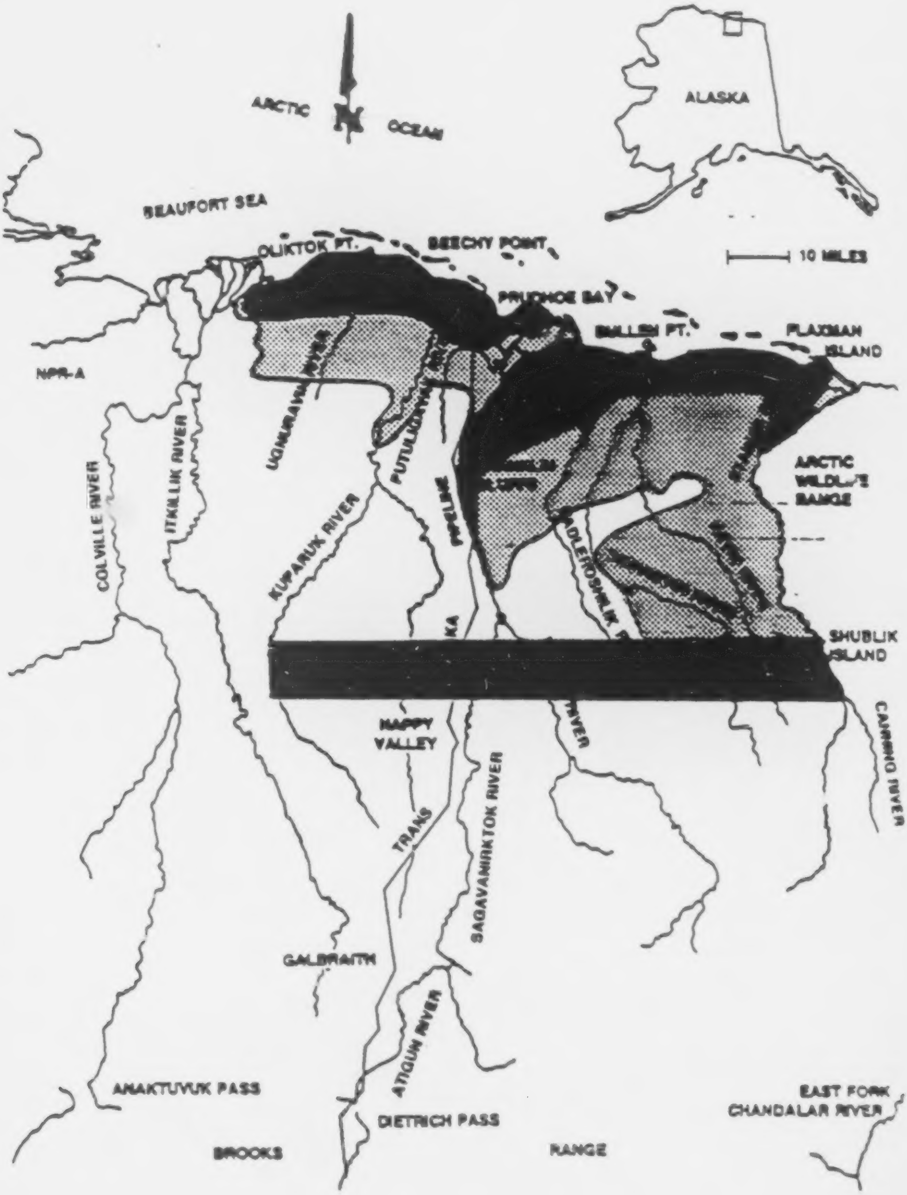
Gavin's survey observations made for Spring, 1978 are quoted as follows:

"First calves of the season were recorded on May 29. Two newly born calves were observed and photographed on the morning of May 29 just east of British Petroleum (BP) drill pad N. A cow caribou was seen lying down in the same area, and, on checking the following day, she also had given birth to a calf. During the season, several other calves were born at various points within the oilfield. These were duly recorded, and, wherever possible, photographs were taken showing their location.

At least ten cows were known to have dropped their calves within the oilfield area, and it is quite possible that there were more, since on one survey 15 cows with calves were counted. Although it was possible to see cows with calves at any point in the field during the calving season, their favorite spots during this period of time appeared to be the area from north of the Central Compressor Plant, west along the Put River to around Drillsite 7 and north to the east side of the BP complex.

As has been our custom in past years, surveys to ascertain calving success for the year were carried out during the middle

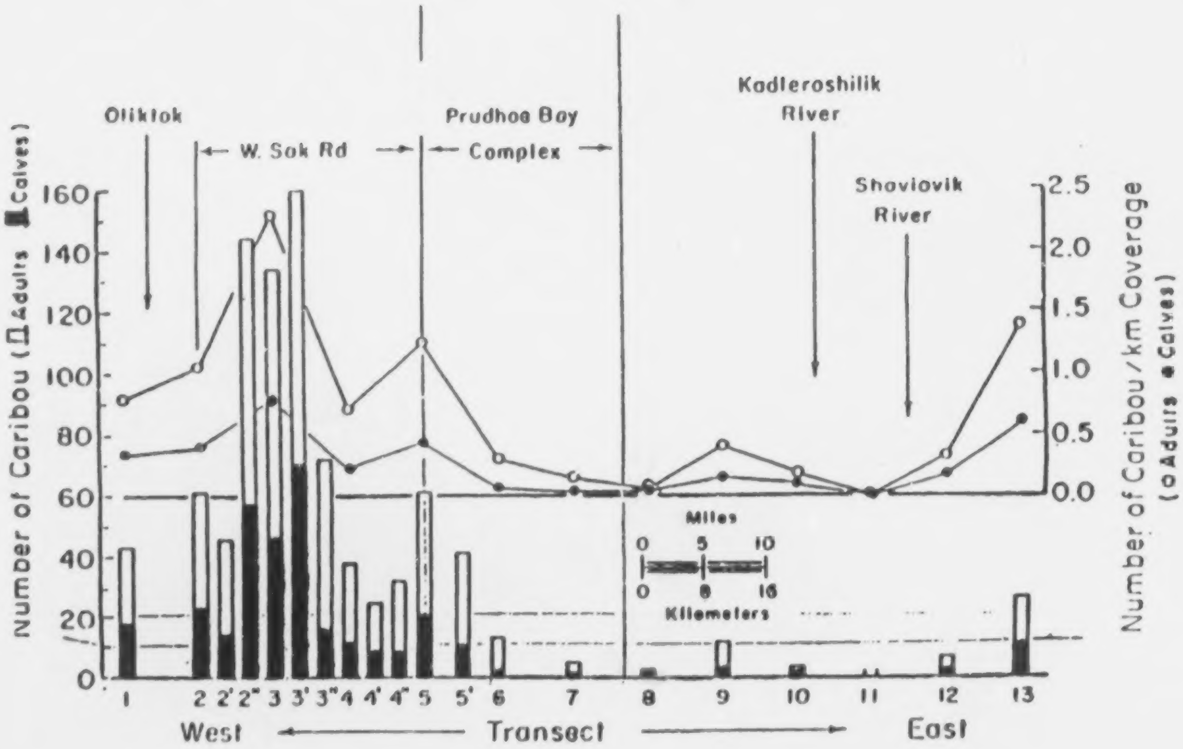
Calving and Summer Range CAH 1970-79 (Gavin, 1979)


ARCTIC
N
OCEAN
ALASKA
BEAUFORT SEA
OLIKTOK PT.
BEECHY POINT
10 MILES
PRUDHOE BAY
BULLEN PT.
FLAXMAN
ISLAND
NPR-A
COLVILLE RIVER
ITKILLIK RIVER
UGNURAVIK RIVER
KUPARUK RIVER
PUTULIGAYUK RIVER
PIPELINE
ARCTIC
WILDLIFE
RANGE
KADLEROSHILIK
SHUBLIK
ISLAND
HAPPY
VALLEY
TRANS
SAGAVANIRKTOK RIVER
CANNING RIVER
GALBRAITH
ATIGUN RIVER
ANAKTUVUK PASS
DIETRICH PASS
BROOKS
RANGE
EAST FORK
CHANDALAR RIVER

[redacted]

Figure 1

Cameron and Whitten (1979)



Data from 1978
11 - 14 June

Figure 2

Table 1. Mean distance from the coast for locations of radio-collared caribou, Colville to Canning rivers, 1983.

Period	Mean distance from coast (miles)	S.D.	n
Calving	16.2	14.0	132
Post-calving	15.7	12.3	72
Mosquito season			
overall	4.1	4.4	764
west[1]	3.7	3.4	224
east[2]	4.3	4.8	540
No mosquitoes, overall	6.2	4.8	402
west	5.5	3.8	98
east	6.5	5.1	304
Mosquitoes present, overall	1.7	2.3	362
west	2.3	2.3	126
east	1.5	2.2	236
Oestrid fly season/August dispersal	18.6	12.4	237

[1] Locations of radio-collared caribou west of the Sagavanirktok River.

[2] Locations of radio-collared caribou east of the Sagavanirktok River.

Lawhead & Curatolo (1984)

of June. Counts at this time indicated a very successful calving season, with the region west of the Kuparuk River appearing to have had somewhat better success than the area east of the Sagavanirktok River. Calf/cow ratios west of the Kuparuk were around the 60:100 mark, while those for the area east of the Sagavanirktok registered around a 50:100 figure."

A more quantitative measure of calving distribution is represented in Figure 2 (Cameron and Whitten, 1979). These data represent counts made from systematic transect overflights through the Prudhoe Bay complex including areas well to the east and west. The highest observed density of calving is in the Kuparuk (Ugnu) area with only low density observations east of the Kuparuk River.

Also of interest is the fact that calving density in the Prudhoe Bay oilfield is comparable to non-developed areas further east.

Further information on the calving, post-calving and summer distribution of caribou between the Canning and Colville rivers was reported by Lawhead and Curatolo (1984). Using radio-collared animals their data clearly show that behavioral observations accurately reflect the highly variable nature of caribou movements at all times (Table 1). In many cases, standard deviations approach or even exceed the means clearly demonstrating that attempts to categorize movements or distribution are highly subjective even with sophisticated radio-collar telemetry.

Further observations by Lawhead and Curatolo indicated that caribou were widely dispersed throughout the coastal plain and northern foothills. However, several areas of higher density were evident by early June. "The highest numbers were observed in two areas:

1) within the Kuparuk Oilfield, between Kalubik Creek and Beechey Point, extending inland approximately 12 miles (maximum of 635 adult and yearling caribou observed on 8 June); and,
2) between Mikkelsen Bay and the Canning River, extending inland approximately 14 miles (maximum of 391 adult and yearling caribou observed on 10 June).

Lower-density concentrations were encountered in three upland areas:

1) the White Hills (maximum of 67 adult and yearling caribou observed on 9 June);
2) the low hills between Franklin Bluffs and the Kadleroshilik River (maximum of 53 adult and yearling caribou observed on 8 June); and,
3) the low hills east of the Kavik River, approximately 20-25 miles south of Mikkelsen Bay (maximum of 178 adult and yearling caribou observed on 10 June).

The area between the Kuparuk and Sagavanirktok Rivers, southwest of Prudhoe Bay and north of Franklin Bluffs, hosted a diffuse, low-density aggregation in early June that included three collared cows. Observations in the remainder of the coastal plain portion of the study area revealed small, widely-scattered groups of caribou in no discernible pattern.

Results of the radio-telemetry study suggest that Central Arctic Herd caribou traditionally use two distinct regions during calving, post-calving, and mosquito season: an eastern region, where caribou ranged between the Sagavanirktok and Katakturuk Rivers (approximately 4,300 caribou) and a western region, where caribou ranged between the Colville and Putuligayuk Rivers (approximately 4,900 caribou).

Caribou were widely dispersed during calving with areas of relatively high density between Kalubik Creek and Beechey Point, and between Mikkelsen Bay and the Canning River; and with lesser concentrations in the White Hills, between Franklin Bluffs and the Kadleroshilik River, and in the low hills east of the Kavik River.

The Kuparuk Oilfield overlaps with the general summer range of the western segment of the CAH. Movements of these animals were synchronized with movements of the eastern segment of the herd. Caribou usually were located north of the Kuparuk Pipeline during mosquito season, probably because of a lack of cyclic temperature variation, which resulted in east-west movements. When southward movements did occur, caribou usually crossed the Spine Road and Kuparuk Pipeline during late evening and early morning hours. Southward movements of the eastern segment also occurred during late evening hours. Thus, it appears that weather, rather than petroleum development, was the primary factor influencing caribou distribution and movements in the Kuparuk Oilfield."

2. How has the Porcupine Caribou Herd been affected by the construction of the Dempster Highway in the northern Yukon?

Response: The Dempster Highway bisects portions of the winter range of the Porcupine Caribou Herd (PCH) and has not caused any measurable effects on the population growth rate nor migratory habits of the PCH. They continue to cross the highway in large numbers and utilize the full range of habitat available to them. Further details follow:

Canadian wildlife biologists have examined the relationship between the Porcupine Caribou Herd and the Dempster Highway. Dr. A. T. Bergerud from the University of Victoria, British Columbia has stated:

"Since the late 1960s construction of the Dempster Highway has bisected portions of the winter range of the herd in northern Yukon. In 1976 new construction transected a major spring migration corridor in the northern Richardson Mountains. The highway was completed in 1978, and at that time a five-mile no-hunting corridor was established along the highway. Crossing of the highway by caribou and use of winter ranges south of the highway have continued to the present time." Bergerud et al. 1984.

Thus it is clear that the Dempster Highway has presented no significant barrier or loss of habitat to the Porcupine Caribou Herd. Indeed, a further examination of the adaptability of caribou to human presence demonstrates that they readily adapt to human presence. Quoting further from Bergerud et al. (1984):

"Caribou are perceived by many as not adaptable to the presence of humans. Yet caribou are one of the few large mammals man has been able to domesticate. One basis for this misconception is their unwary behavior. Caribou escape strategies, i.e. detecting motion, grouping up, and standing ground or approaching and verifying, which are successful for natural predators, are ill-adapted to men with firearms.

Caribou are as adapted as other North American ungulates to man's presence. When caribou are captured and placed in holding pens they become calm within hours. Moose captured in Newfoundland remained in a state of panic and many died in captivity (Pimlott and Carberry, 1958). Recently Dr. Bergerud placed wild adult caribou in a game farm and within two weeks they could be approached to within ten meters. Within two months the animals would enter a shed and stand on a scale for weighing. The large herds of caribou feeding along the highway on the Avalon Peninsula, along the TAPS corridor, and along the Dempster Highway are comparable to the herds of habituated pronghorn antelope (Antilocapra americana) on the Great Plains, which feed beyond rifle range. Caribou learn that chainsaws signal availability of arboreal lichens, just as black-tailed deer (Odocoileus hemionus columbianus) approach felled trees to gain access to browse. Our conclusion is that caribou can tolerate and adapt to the presence of man if we will permit them to live by not overharvesting. Caribou will cross major transportation corridors and physical obstructions to maintain their space, but there is probably some upper limit to their tenacity."

(Reference - Bergerud, AT., R. D. Jakimchuk, D. R. Carruthers, 1984. The buffalo of the North:Caribou and human developments. Arctic 37(1):7-22.)

3. What are the hunting restrictions for the Central Arctic Herd?

Response: Sport hunting of caribou is strictly prohibited in the Prudhoe Bay oilfield. Outside of the oilfield and pipeline corridor, five caribou may be taken annually by Alaska state resident hunters. West of the Itkilik River each subsistence hunter may take ten animals yearly; similarly ten animals may be taken annually in ANWR by each subsistence and State resident hunter. The open season runs continuously throughout the year and is closed only during May and June. No-hunting restrictions are strictly enforced in the Prudhoe Bay field and any violations by Company or contract individuals will result in immediate dismissal. Further details follow:

Limited sport and subsistence hunting of the Central Arctic herd occurred prior to 1976 since at that time there were no controls on hunting. Data prior to that period concerning the pre-1976 harvest are unknown (Cameron and Whitten, 1979). Mortality from hunting appears to have been low (<2%) since 1976 (Cameron and Whitten, 1979, Hinman, 1981).

Bergerud et al. (1984) stated that:

"The construction of the Dalton Highway (North Slope Haul Road) began in April 1974 and was completed in September 1974. The 122-cm diameter Trans-Alaska Pipeline System was constructed parallel to the road and the Sagavanirktok River in 1975 and 1976. A small-diameter natural gas pipeline (buried) was constructed beside the Dalton Highway in 1976 and 1977. During this period hunting was restricted within 8 km of the Dalton Highway.

The Central Arctic herd continued to migrate north and south, parallel to the TAPS and the Dalton Highway, during and after this construction period. Between 1973 and 1982 the herd had increased at an average annual rate of 13%. Productivity in June was high (85 calves/100 cows) (Banfield et al., 1981). Mortality rates probably decreased after 1976 because of legal and illegal wolf hunting, and hunter harvest of caribou is believed to have declined as a result of implementation of controls. The construction and operation of two pipelines and the Dalton Highway through the Center of the range of the Central Arctic herd and the proliferation of oilfield facilities in the Prudhoe Bay area were not correlated with a negative demographic response by the herd between 1974 and 1982."

Currently firearms hunting is strictly forbidden within the Prudhoe Bay oilfield as well as along a five mile corridor throughout the length of the TAPS corridor. Recently, illegal hunting activity along this corridor of the Dalton Highway has accounted for an estimated annual harvest of approximately 600 individuals. Hunting is legal throughout the remainder of the fall and winter range of the Central Arctic Herd and accounts for an annual harvest of less than 3% to 5% of the population.

4. What is the size of the Brown (Grizzly) Bear population on the North Slope and what has been the history of interaction with the oilfield development at Prudhoe Bay?

Response: The brown (grizzly) bear population in the State of Alaska is currently estimated at approximately 40,000 individuals. It is neither a threatened nor endangered species in the State. The vast majority of individuals are distributed south of the Brooks Range and estimates of the North Slope population are approximately 850-950 individuals. We were unable to locate any verifiable record of a brown bear being destroyed in defense of life or property within the oilfield. Further details follow:

The historical field observations of Angus Gavin provide the best insight to the interaction of the barren ground grizzly with oilfield development. He states:

"The barren ground grizzly was a fairly frequent visitor around the oilfield camps at Prudhoe Bay during the early years of field development. They were attracted there by the smell of food and the availability of numerous food scraps. With the installation of proper garbage disposal units, however, very few bears are now to be seen around the camps at Prudhoe, even though the population of these animals within this region of the Slope remains quite stable. This was most evident during the building of the pipeline haul road and the construction of the pipeline south from Prudhoe.

There were many camps along the way during this period of time, and bears were a problem at practically all of them. There always seemed to be several around each camp, looking for scraps or a handout. With the completion of the road and oil pipeline and the closing down of the majority of the camps, there is now little to attract them to these facilities, although we still see bear in the vicinity of these camps during our surveys. Most, however, have moved to their more natural habitat and surroundings.

During the past two years the vast majority of bear recorded have been seen along the river bottoms and deeper valleys, with only a few being seen out on the open tundra.

From our observations, although no complete inventory has been attempted, there does not seem to have been very much change in their overall population since we first started regular surveys of this region of the Slope. As indicated, there was some shifting during the construction of the haul road and pipeline; however, with these completed, bear have now scattered back over their more normal habitat."

Strict firearms hunting restrictions remain in effect throughout the Prudhoe Bay oilfield area thus eliminating hunting mortality. The Alaska Department of Fish and Game, Survey and Inventory Report for 1985 states:

Research by Reynolds (1984) has shown that Brooks Range and North Slope grizzly bear density varies from 1 bear/17 mi^2 to 1 bear/300 mi^2, with a mean of 1 bear/100 mi^2. Based on these densities and food availability within the North Slope topographic provinces, the population is estimated at 850-950 bears.

The CHAIRMAN. Thank you very much, Dr. Maki. Next is Mr. Jim Weeks, manager of Prudhoe Bay field operations of Arco.

STATEMENT OF JAMES WEEKS, MANAGER, PRUDHOE BAY FIELD OPERATIONS, ARCO ALASKA INC., ACCOMPANIED BY MARK SCHINDLER

Mr. WEEKS. Thank you, Mr. Chairman and distinguished Senators.

This morning I would like to confine my testimony to some supplemental points to the written testimony I submitted. I would like to give a little background because I think it will help you to understand some of the points I make.

I have been involved in North Slope development since 1983, having worked both on the engineering team that designed the Prudhoe facilities and five years on the team that designed the Kuparuk facilities.

For the last three years I was manager of field operations for Kuparuk and then recently moved over to Prudhoe as manager of field operations for that development.

The points I want to make, as I have been involved in field development for the 14 years, we have seen technology change and our understanding of the Arctic change. And we have adapted our practices and designs to better mitigate some of the conditions that are up there. That is the thrust I would like the testimony to take.

Let us start with gravel on the North Slope. That is sometimes inseparable with water. On the chart over there you will see an aerial mosaic of the Kuparuk River area, and I pass it around so you can have a little closer look at it.

But I want to point out a couple of features on that. When we developed Kuparuk there was no large river to obtain gravel from similar to where there was in Prudhoe.

And the technique that was established was to strip overburden, about 10 to 15 feet of overburden off of the tundra, stockpile it in an environmentally conscious manner, mine the gravel essentially and lay the gravel roads and pads.

Mine site B, as Mark will point out, was the site that was originally opened to develop the 20 mile road into Kuparuk, the initial drill sites. We opened mine site C, which furnished the gravel for the southeastern part of the field. Mine site D furnished the gravel for the central part of the field.

The point I want to make with that is that is not a very big gravel pit for the area we are developing, and when those pits are depleted they are flooded with water. And that water then becomes available for use in drilling wells and supplying our people with potable water for their consumption. That practice has proved very valuable at Kuparuk.

At varying depths, gravel underlies all the North Slope. The rivers up there that have been flowing for eons have deposited lots and lots of gravel on the North Slope. In fact, every single shothole that was shot during the 1,300 miles of seismic that was done at ANWR logged gravel.

So there is evidence of an abundance of gravel at fairly shallow depths, 10 to 12 feet again, underlying the overburden material at ANWR.

If that type of gravel-mining technique will not work at ANWR or is not desirable at ANWR, there are several other solutions for obtaining water with which to drill wells and to use in our operations.

There is a shallow at the crustaceous interval at the base of the permafrost underlying Prudhoe Bay and Kuparuk. In fact, Conoco taps this aquifer, uses it for their water supply, drinking water as well as water to run their operations with.

It is nearly fresh. It does have a chloride content about five to six times less than seawater. So to make it potable, you do have to have a small desalinization plant. But only for that water that you consume.

The water is perfectly good for drilling activities, which are the largest consumers of water on the slope. If for some reason that technique will not work, it is possible to drill wells with seawater, which is done around the world, and that is available year-round in the ANWR area, as you well know.

There are also systems developed to drill wells using a closed mud system, and this enables you to recirculate and recycle the mud from well to well, which drastically reduces the consumption of water in the drilling operations.

So the right answer for ANWR, it obviously needs to wait, the development of additional detail and understanding of what needs to be done and how it needs to be done. But I am convinced that basic water supply for drinking and drilling will not be an issue at ANWR.

Let us move a little bit back to gravel. Large quantities of surplus gravel still exist at Prudhoe, even after 20 years of development. There are 360 square miles in the Prudhoe Bay unit and only 0.3 percent of that has been used for mining gravel to build all the facilities.

And only 2 percent of that area is actually covered by gravel roads and pads. So it does not have to be a very large hole to supply your needs.

The way we plan this gravel, we introduce the gravel needs at an annual gravel conference, that is attended by industry and the various state and Federal agencies that supervise that activity.

This process offers the agency an opportunity for input into our plans early on, informal mitigative techniques and practices are agreed to at those meetings, and additional refinements are made during the public comment period.

Now, several innovations have resulted from those meetings. We sometimes will locate the mine site close to a stream where it can be flooded, making additional habitat for birds and fish.

We will sometimes locate it, or move a drill site out of the way of some marsh land that may be used by migratory water fowl. It is a very positive process, and it will reap benefits for both industry and the environmental community, and I would envision something similar to that would be appropriate for ANWR.

Sometimes we can beneficially use the overburden, rather than stack it in a pile somewhere. It is often possible to put overburden down, a filter fabric over the top of it, and then top that with two to three feet of gravel, therefore beneficially using it as well as conserving gravel.

All these measures tend to dispel the myth that there is a shortage of gravel on the North Slope, and an irreparable harm is done by our gravel mining and placement activities.

Now, let us discuss the reserve pits, if I might a little bit, Mr. Chairman. If you look at the exhibit on the chart, that is an actual scale drawing of drill site 1 at Prudhoe Bay.

Originally, when we established the design criteria at Prudhoe, our approach was conservative. Wells were spaced 160 feet apart, so that a conventional kind of rig could be laid down between wells without interfering with the well they just drilled or the next well to be drilled.

This required a long pad, as you see, with 160 foot spacing between the wells. The natural thing to do with the muds and cuttings that were removed from the hole were to place them in a pit adjacent to the wells, as Mark is pointing out.

The CHAIRMAN. You have separate wells drilled 160 feet apart?

Mr. WEEKS. Yes, sir.

The CHAIRMAN. You do not have slant drilling?

Mr. WEEKS. Well, under the ground they are deviated. This is just the surface location.

The CHAIRMAN. Those are drilled from a common——

Mr. WEEKS. Yes. That is a single gravel pad, with the wells 160 feet apart.

The CHAIRMAN. You mean that is the bottom hole——

Mr. WEEKS. No, that is the Christmas tree location. If you envision, you are looking down from an offshore platform, it is 160 feet apart rather than six feet or something, as it would be offshore.

As we moved into the Kuparuk area, we enhance that design and technology advanced to the point where we could drill wells on 60 foot centers. And the drill sites you see, is an actual drawing of a drill site at Kuparuk where the spacing was shortened from 160 to 60 feet.

This enabled us, as you can see, to conserve the amount of gravel and allowed us to build smaller pits, smaller gravel, less impact.

We drilled over 1,000 wells at Prudhoe and Kuparuk and technology still advanced, and we are now drilling wells at Kuparuk on 25 foot centers, as you can see from Exhibit 3 there.

Senator MURKOWSKI. How much overall area does that take? On the surface?

Mr. SCHINDLER. The scale is about one inch to 500 feet.

Senator MURKOWSKI. So that is X by X.

Mr. WEEKS. Oh, I can get that, Senator. I do not have that data right now. But as you can see, those are to scale, all to the same scale.

Senator MURKOWSKI. I am just curious how much surface you were utilizing there. Can not somebody take the scale and figure it out? About 1,600 feet. Is it not? Two thousand feet?

Mr. SCHINDLER. In Exhibit 3, it is about 1,500 feet long. Extrapolate that to Exhibit 1 and 2.

Mr. WEEKS. Exhibit 1 is about a mile long. Probably, Exhibit 3 is about a quarter of a mile.

Mr. SCHINDLER. Keep in mind that each one of these drill sites is depicted here at the same scale.

Senator MURKOWSKI. You have got how many wells on an area how big?

Mr. WEEKS. There are 16 wells on that area that is probably 30,000 square feet. Less than an acre.

Senator MURKOWSKI. Thank you.

Mr. WEEKS. Now, to add wells, you do not need to double that. You just continue drilling them on 25 foot centers north or south as you see on the sketch.

We are still not happy with that. As you can see, the reserve pit, when the pad gets that small, becomes a disproportionately larger portion of the activity. We are experimenting and developing technology to enable us to drill wells on 10 foot centers.

Also, we have plans at Kuparuk to develop a drill site without any permanent reserve pits, where the cuttings, principally solids, from the well, would be disposed of in a hole dug in the permafrost, encapsulated by freezing or some other means.

We have modified our mud systems such that we have a permit to inject the fluids from the drilling operation into the annulus of one of the wells that we have just drilled on the pad.

So what we are down to is disposal of the cuttings from the wells in the Outer Continental Shelf areas of the Gulf of Mexico. Those cuttings are discharged into the water, according to Federal discharge standards.

Let me address the reserve pits a little bit. As you can see, we have significantly reduced the size of reserve pits. But we still have them. And they are environmentally sound but they do present us operational problems.

They will with snow, which melts in the summer. That coupled with rain requires them to be pumped out to keep them from overtopping and washing out. These pumping operations are closely monitored and conducted in accordance with state and Federal water quality standards.

All the water discharged directly into the tundra, which we do do, meets state drinking water quality standards. Prior to discharge, it is sampled, tested, and must meet the standards before we can get a permit to discharge it to the tundra.

Some of the water is indeed put on the roads, the same water, for dust control. Reserve pit water that does not meet these rigid standards is injected down a permitted well.

Pit maintenance is a problem, and that is why we continue to experiment with technology to eliminate that from our business as well.

The Kuparuk oil field, as we heard many times, is a principal location for use by the Central Arctic Herd in their summer calving, feeding and insect relief periods.

Years of investigation have been focused to determine to what degree pipeline structures impede caribou movement through the field, and I would like to take you through some of the technological advances that we have made to mitigate that.

The chart you are looking at there, Exhibit 5, shows the conceptual arrangement of how the pipelines at Prudhoe Bay were originally designed. There was thinking that the best time to build the pipelines would be the summer time.

Therefore, a construction pad was laid adjacent to the pipeline right away. The pipelines were constructed on vertical support members, elevated not very far above the tundra.

Gravel ramps were placed over those pipelines at key locations to help the caribou migrate back and forth through the field. For routine access to the wells and facilities, a separate access road was laid, as you can see.

At Kuparuk, we determined that we did not really need the construction pad, and Exhibit 6 will show the concept that we initially did there. We located the pipelines 25 feet from the road, and this was so we could move wide loads down the road, that was strictly the criteria, using the access road as the construction pad as well as the access road.

The pipelines were elevated 5 feet to allow caribou migration in an unlimited number of locations, since we learned at Prudhoe that caribou do not prefer gravel ramps. Technology or techniques in pipeline construction actually demonstrated, it is better to build pipelines in the winter time on the North Slope from an ice road.

So from Exhibit 7, the concept we are now using is to construct the pipelines in the shortest manner between the two facilities to be connected, 100 or 1,000 or 2,000 feet from the roads, and still elevated 5 feet to allow unlimited caribou migration.

This virtually allows movement of caribou unimpeded through the field. And the access roads are laid to minimize disturbance to the various lakes and wetlands. These techniques, I think, are also being used at the future developments on the slope and no doubt will be the way that things are done at ANWR.

The point I want to make with all this is that through time, as we understand the Arctic more, as we understand the way we do our business more, we do make improvements in the technology that not only makes our business easier but mitigates environmental concerns as well.

Next week, Prudhoe Bay and TAPS will celebrate their 10th anniversary since the commencement of commercial oil production from the North Slope. During this time, half the reserves of Prudhoe have been produced and transported to market.

Experience has demonstrated that the excessive predictions of those opposed to the project were unfounded. An industrial complex, serving a large portion of America's energy needs, is operating in the Arctic without undue environmental harm.

The predicted disasters have just not happened. The lesson of Prudhoe and TAPS is that the claims and predictions must be looked at scientifically and objectively, and that every effort should be made by you, the public policy decision-makers, to avoid being unduly influenced by emotional claims which reflect a bias, whether that bias is for or against the project.

In conclusion, over the last 14 years, I have personally observed technological advances that have mitigated, to a large extent, the impact of oil development on the environment and wildlife and hope the examples I have shared with you convince you that industry is meeting and will continue to meet the challenge to develop future generations of facilities at ANWR in the same manner.

I hope I have shown that each generation brings new innovations, and that ANWR will be no exception. And I hope I have demonstrated that the lesson of Prudhoe and TAPS has reduced to a myth the doomsday claims and predictions of 15 years ago, just as ANWR will to the similar predictions of today. Thank you.

[The prepared statement of Mr. Weeks follows:]

STATEMENT OF JAMES WEEKS

MANAGER, PRUDHOE BAY FIELD OPERATIONS

ARCO ALASKA, INC.

BEFORE THE

SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

FRIDAY, JUNE 12, 1987

Good morning, I am Jim Weeks, Manager of the Prudhoe Bay field operations for ARCO Alaska, Inc. with offices located at 700 G Street in Anchorage, Alaska, U.S.A. 99501.

This morning I would like to share with you my knowledge and experience regarding oil and gas development on the North Slope of Alaska. My perspective is rather unique as I have been involved in the development and operation of North Slope oil fields since 1973. I spent four years with the engineering group that designed the original Prudhoe Bay production facilities and pipelines, and five years as Project Manager overseeing the design of facilities for the Kuparuk River field, during which time many technological and environmental advances in the design and operation of our facilities were accomplished. For the last three years I managed field operations for the Kuparuk river oil field.

My current responsibility is to manage the ARCO operated portion of the Prudhoe Bay field. These two fields, which rank as the two (2) largest oil fields in North America, are prime examples of well developed maturing oil developments. Our success in developing Prudhoe and Kuparuk clearly justifies our firm support for the Department of the Interior's recommendation to conduct an orderly oil and gas leasing program for the §1002(H) area.

Today I will key on the improvements in technological, environmental, and operating practices within the Prudhoe and Kuparuk developments. We have moved from "first generation" Arctic oil development at Prudhoe to "second generation" development at Kuparuk. Our experiences at these two developments have served, and will continue to serve, as benchmarks for technological and environmental decisions for future North Slope oil fields. We are proud of our track record and would like to thank you for this opportunity to put our accomplishments on record.

During the ten years since its start-up, over five (5) billion barrels of oil have been shipped from the North Slope through the trans Alaska pipeline system. At present, the pipeline ships almost two (2) million barrels of oil per day representing over 20 percent of U.S. production. The Kuparuk development contributes approximately 300,000 barrels per day while Prudhoe continues to contribute one-point six (1.6) million barrels per day. Production facilities and pipeline systems which achieve this mega production are world class engineering achievements. We have succeeded in Arctic Alaska because we have taken the trouble to find out about its environment, both from an environmental protection and engineering standpoint. It is impossible to properly plan any development activity without giving equal attention to engineering and environmental concerns. This planning begins long before a permit is issued and includes consideration of resource management issues such as gravel and water use, and fish and wildlife protection. Our resource management experiences at Prudhoe and Kuparuk have been extremely positive, and we expect future North Slope developments to model their operations in a very similar manner.

Let us first discuss gravel usage. The North Slope of Alaska is blessed with large quantities of gravel. The rivers of the North Slope have generated enormous supplies of gravel over the eons of their existence. At varying depths, gravel underlies virtually all the North Slope. Large quantities of surplus gravel still exist at the Prudhoe Bay and Kuparuk oil fields even after twenty (20) years of development. One (1) primary mine site and three (3) secondary mine sites service the three-hundred sixty-two (362) square mile Prudhoe Bay unit. This can be put in perspective if you consider that less than one third of one percent of this three-hundred sixty-two (362) square mile area has been used for gravel mine sites and approximately two (2) percent of that area is actually covered by gravel roads or pads. The remaining area remains in its natural tundra state.

The State of Alaska policies on gravel mining have evolved over the last ten (10) years. During early development of the Prudhoe field, gravel was mined from floodplains. At the preference of the resource agencies, mine site development moved to upland and retired oxbows of rivers. Now that successful precedents have been established and with the more recent river floodplain mining techniques perfected, resource agencies are now reconsidering and recommending floodplain mining if conducted pursuant to stringent stipulations.

North Slope exploration and development projects typically are introduced to the permitting community during "annual gravel conferences" sponsored by the oil companies. This process offers the permitting agencies the benefit of previewing projects prior to submittal of permit applications. Significant environmental issues are identified and informal permit mitigation occurs, although further review continues during the public comment period. These comprehensive planning efforts have produced widely accepted mitigative techniques such as: locating mine sites near an active stream so the stream can be diverted to flood the mine site at abandonment or, fertilizing and seeding the excavated overburden from a mine site. During overburden removal at the most recent Kuparuk mine site, the top two (2) feet of overburden (rich in nutrients) was separately stockpiled for future backfill, fertilization, and seeding. It is sometimes possible to use the overburden material in the construction of gravel pads. When this is the case, 2-3 feet of overburden is initially placed, covered with a filter fabric and then capped with 2-3 feet of gravel. This method, used extensively at Kuparuk, not only beneficially uses the overburden, but conserves gravel as well. In 1985, ARCO, as operator of the Kuparuk oil field, initiated a five (5) year mine site rehabilitation plan which is reviewed with agencies annually. Our experience has shown that restoration efforts are effective as early as the next growing season.

All these measures, beneficial to both industry and the regulatory agencies, arose from annual gravel conferences, a benchmark practice that will most likely be preferred in ANWR. Our experience in gravel exploration and placement dispells the myth that there is a scarcity of gravel on the North Slope, and that irreparable harm is done by gravel extraction. We have demonstrated that impacted areas can be restored and even improved.

Consolidation of facilities is a primary permitting criteria. A prime example of consolidation of facilities can be seen by comparing the Deadhorse service city area to the Kuparuk Industrial Center (KIC).

Starting in 1969, the State of Alaska began issuing surface leases to North Slope oil field service contractors. The leases are located in an area along the southern boundary of the Prudhoe Bay unit in an area called Deadhorse. ARCO and standard Alaska production company, as operators of the Prudhoe Bay unit, have no jurisdiction over surface leases in Deadhorse. The State of Alaska Department of Environmental Conservation, Department of Transportation, and Department of Natural Resources are responsible for administering the leases, monitoring Deadhorse development, and enforcing environmental compliance. On site environmental management is by a Department of Environmental Conservation field office.

Duplication of facilities and services has occurred in Deadhorse. Speculators have built gravel pads only to see them idle for lack of business. Compliance with lease terms has been a problem and comprehensive planning of operations is rare.

During early planning stages for Kuparuk, it was apparent that it would be more efficient to have a planned and better controlled oil field service base as opposed to a Deadhorse type community. Discussions between the Prudhoe and Kuparuk operators; State, Federal, and local government; and oil field service contractors resulted in the creation of the KIC. The KIC is a profit motivated business venture operated by native corporations and owned by the local government. Operations are consolidated on a single pad with one operator subleasing space and services to oil field service contractors. Enforcement was easier and proliferation of facilities has not occurred. In addition, resource agencies are able to integrate the location and operation of the KIC into their overall planning of Kuparuk.

Production and injection facilities are usually limited in number by reservoir characteristics, however, their exact location evolves through the permitting process. Support facilities, such as roads, gravel mine sites, base camps, storage pads, and utility corridors, are consolidated by number or location. A neighboring oil field's needs such as road systems, bridges, causeways, and pipeline corridors are evaluated and integrated into the planning for other developments.

The Arctic environment has posed many construction challenges. North Slope oil developments basically consist of a network of gravel roads and pads with production facilities set on pilings. Gravel roads and pads are nominally five (5) feet thick to provide adequate thermal protection to the underlying permafrost layer. Pipelines and production facilities are placed upon vertical support members or pilings to prevent heat transfer, snow drifting, and to provide adequate passage for wildlife such as caribou. Natural drainage patterns are also maintained. ARCO's "Drainage and Erosion Control Design and Criteria Manual" for culverts, gravel pads, and embankments is now the standard by which most industry and public projects, proposed for the North Slope, are judged. This manual incorporates the best available civil engineering technology on hydrology in Arctic wetlands.

Major construction of production and living facilities typically occurs at a Lower 48 fabrication yard. Facility modules are then barged to the North Slope where construction is limited to moving the modules to pre-set pilings where final electrical and piping tie-ins are made. This construction procedure relieves the Arctic environment of enduring massive fabrication activities. Construction of pipelines occurs during the winter months when wildlife have migrated and the frozen tundra provides safe access. The preferred time for gravel hauling is during the winter months when disruption of caribou and other wildlife is non-existent. However, when gravel must be placed in the summer, monitoring studies funded by industry and resource agencies have identified key summer weeks when gravel hauling is limited due to potential wildlife disturbance.

Drilling operations are also consolidated. A single drill site at Prudhoe can support over thirty (30) directionally drilled wells which may service as much as a sixteen (16) square mile reservoir area that is more than 10,000 feet deep. For comparison, to develop an area that size with the conventional technology would require over thirty (30) separate pads, and over twenty (20) miles of extra roads and pipeline corridors.

When we first pioneered the design of production facilities at Prudhoe, there was very little operating history or understanding of how things worked on the North Slope, so the approach was conservative. For instance, wells were spaced one-hundred sixty (160) feet or more apart so that the derrick of a conventional rig could be laid down without obstructing the next well (see Exhibit 1). Since it is environmentally and economically prudent to locate wells in clusters to minimize the amount of gravel roads and pads, this concept required a long narrow drill site to accommodate the necessary wells to develop the reserves. The natural thing to do to handle the drilling muds and the cuttings removed from the hole was to construct a gravel reserve pit area adjacent to the drill pad, in which these mud and cuttings were impounded.

Technological advances made since this initial concept have enabled us to develop Kuparuk with wells on 60' spacing (Exhibit 2). From an environmental standpoint, this means that there is less gravel placed on the tundra, smaller reserve pits for muds and cuttings, and less impact. We've drilled over 500 wells at Kuparuk and 400 at Prudhoe and the drilling rig technology has progressed to a point where we are now drilling wells on 25' centers, using a rig designed such that only the derrick, rather than the entire rig, is cantilevered over the well (Exhibit 3). We are now looking at technology to shorten the distance between wells to 10', to further reduce the amount of gravel placed on the tundra. These technological advances have produced smaller and smaller reserve pit requirements.

At Prudhoe the reserve pits are large enough to hold the cuttings and mud from all the wells anticipated to be drilled on the pad. As well spacing was decreased at Kuparuk, the reserve pit became a larger part of the pad proportionately until the solid control and mud systems were developed so that fluids are now injected into the annulus of one of the wells on the pad. Now reserve pits are needed only for the solids - principally cuttings removed from the hole. In the outer continental shelf areas of the Gulf of Mexico and other locations, these cuttings are normally discharged into the water in accordance with federal discharge permits.

The EPA and Alaska Department of Environmental Conservation (ADEC) currently permit drilling fluids and cuttings to be discharged into the reserve pits adjacent to the wells. Although these pits are environmentally sound, they present operational problems. They fill with snow which melts in the summer. This snow melt, coupled with rain, fills the pits to a level that must be pumped out. We are experimenting with technology to dispose of the cuttings without conventional North Slope pits, either by encapsulation on the drill site, or some other means. Before long I predict that pits will be open only long enough to be filled with cuttings and then they will be buried and allowed to freeze and become an integral part of the permafrost. An additional benefit of this is that frozen pit contents will not migrate laterally into the tundra, or through the 2,000 feet of underlying permafrost to contaminate groundwater. I'm convinced that as North Slope development progresses, third and fourth generation oil fields will employ the latest technology for drilling muds and cuttings disposal.

Once again, technological advances and current practices have served to dispell the myth that the North Slope ecosystem is being irreparably damaged by our drilling and development activities.

Air emissions from North Slope production facilities are controlled by stringent State, Federal and local government standards. Prudhoe and Kuparuk facilities are constructed with design controls instead of add-on or supplemental controls. In other words, original equipment is purchased that exceeds new source performance standards and best available control technology criteria. Years of ambient air quality monitoring and dispersion modeling have confirmed that we are well within compliance with State and Federal government air quality standards. Regional air quality on the North Slope of Alaska has not been significantly degraded by existing oil and gas development, and it is regrettable that misrepresentations of the oil industry's record in meeting all air quality standards still persist.

When the scale of oil and gas development on the North Slope is considered, the remarkably good air quality record speaks to a regulatory framework that works, and an industry that is attuned to environmental needs. Our turbines are fueled with natural gas which is the cleanest fuel available. Each generation of facilities bring improvements. For instance, at Kuparuk, facilities were designed such that waste heat from large gas turbines is used for process and building heat, thereby eliminating separate fired heaters and the attendant emissions.

Recently, inaccurate statements have been made regarding North Slope air quality. One such statement concludes that air pollution will be a significant problem if additional production facilities are developed in this region. At present, no significant air pollution problem has been attributed to North Slope oil and gas activity. We believe that ANWR and the existing Prudhoe Bay operations are a sufficient distance from each other that the cumulative impact on air quality will be negligible. This has been demonstrated within the Kuparuk field which is downwind of Prudhoe Bay and has had no significant cumulative impact.

North Slope oil and gas operations are commonly blamed for aerosol haze concentrations known as "Arctic Haze". Studies conducted since the mid-1970's indicate that central Eurasia is the primary source for Alaskan Arctic haze during mid-winter, whereas European sources become more predominant in the spring. There is no evidence that North Slope oil and gas operations have significantly contributed to Arctic haze.

The Prudhoe and Kuparuk operators have spent well over 100 million dollars studying and mitigating predicted or forecasted impacts on fish and wildlife resources of the North Slope of Alaska.

The Kuparuk oil field on the Arctic coastal plain of Alaska is in an area of traditional summer use by the Central Arctic caribou herd, who use it for calving, feeding, and insect relief. Several years of investigation have been focused on determining to what degree structures (especially roads and pipelines) and activities may present problems to caribou moving through the oil field, and determining which mitigation techniques are most efficient in allowing relative freedom of movement. Our design and construction philosophy reflects the results of these studies and our experience with North Slope wildlife.

At Prudhoe the original pipelines were constructed adjacent to a construction pad, which allowed construction of the pipeline during the warmer summer months (see Exhibit 5). Separate roads were built for normal vehicle traffic to and from the wells and facilities. The pipelines were fairly close to the ground, and gravel ramps were constructed over the pipelines to allow for caribou migration.

At Kuparuk, the separate pipeline construction pad was eliminated, and the pipelines were placed 25 feet from the main roads (see Exhibit 5). Pipelines were also elevated a minimum of 5 feet above the tundra to enhance caribou migration since our experience at Prudhoe indicated ramps were not preferred (see Exhibit 6). Advancements in pipeline construction techniques made it possible to construct pipelines in the winter from ice roads thereby eliminating the need for the pipeline to be close to the gravel road. Pipelines on the slope are now being elevated a minimum of 5 feet and separated by several hundred or thousand feet from the roads (see Exhibit 7). Leak detection and other surveillance methods are being employed to monitor the integrity of these cross country pipelines.

Structures found not to be barriers to movement through the field were roads with and without traffic, pipelines next to roads with little traffic, and pipelines away from roads. The one situation where caribou had significantly lower crossing success was a pipeline next to a road with traffic. The bext mitigation techniques are elevating the pipeline 5 feet above the tundra and separating the pipeline from roads with traffic. Caribou ramps were found not to be very effective in increasing crossing success and were not used when traffic was present.

The investigations conducted in the Kuparuk oil field have demonstrated which forms of mitigation are effective in allowing relatively free movement by caribou in an oil field. These solutions should be effective anywhere on the Arctic coastal plain.

Once again, our experience has dispelled the myth that pipelines and roads impede the free movement of caribou.

It is interesting to note that many of the arguments against ANWR are the same arguments that were aired against the Trans Alaskan Pipeline System, better known as TAPS.

Among the specific concerns raised by the pipeline's critics were the following: with respect to pipeline engineering and designing, claims were made that the pipeline was technically flawed, made of inferior materials, and not built for operating under severe Arctic conditions. Opponents of the project brought forth a horde of technical witnesses to testify that the pipe was particularly vulnerable to stresses caused by thawing of permafrost and rock slides, and would be torn apart by earthquakes.

Environmental groups also predicted that Alaska wildlife would be devasted by the pipeline. Animals claimed to be affected included caribou, moose, grizzly bears, musk ox, foxes, wolverines, polar bears, dall sheep, wolves, and a large variety of birds and fish. The most often voiced single concern was that the pipeline would block animal migrations -- particularly the annual migrations of caribou, critics claimed the pipeline would threaten the future survival of the migratory herds.

Some critics of the pipeline asserted that an essential wildlife habitat would be destroyed due to construction and maintenance of the pipeline.

Specific charges were made that amounts of gravel would have to be taken from streams and rivers, destroying fish and their habitat and that siltation from construction and erosion from disturbed areas would have catastrophic consequences.

Another prediction was that the pipeline corridor, once denuded of vegetation, would reestablish itself at an agonizingly slow rate, and that oil company attempts at revegetation would not succeed.

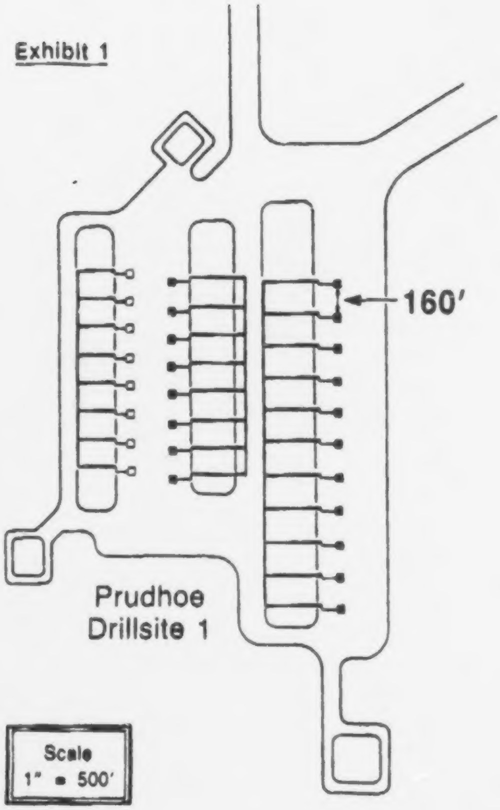
Oil spills were quite naturally a concern, some claiming that any spill from the pipeline would have a devastating effect.

The experience of TAPS has demonstrated that the excessive predictions of those opposed to the project were unfounded. A massive project serving the public interest is operating without undue environmental harm. The disastrous effects that I have just recited have not come to pass.

The lesson of TAPS is that claims and predictions must be looked at scientifically and objectively and that every effort should be made by the decision makers to avoid being unduly influenced by emotional claims which reflect a bias whether for or against a project.

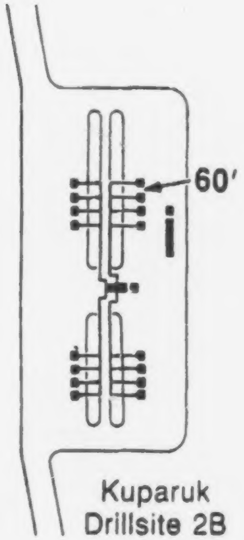
Over the last four years, I have personally observed technological advances that have mitigated to a large extent the impact of oil development on the environment and wildlife. From low elevation pipelines to adjacent construction pads to elevated cross-country pipelines, from wasted heat to heat recovery, each generation of development brings new innovation. I'm convinced that industry will meet the challenge to develop future generations of facilities at ANWR in an even more environmentally conscious manner. Thank you again for this opportunity to present this information.

Exhibit 1


160′
Scale
1" = 500′

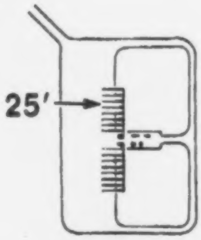
Prudhoe
Drillsite 1

Exhibit 2



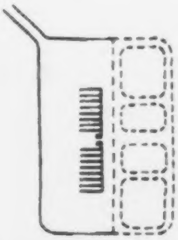
Kuparuk
Drillsite 2B

Exhibit 3



Kuparuk
Drillsite 3H

Exhibit 4



Conceptual Kuparuk
Compact Drillsite

Exhibit 5

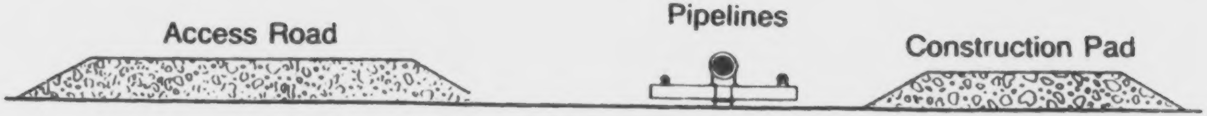

Access Road
Pipelines
Construction Pad

Exhibit 6

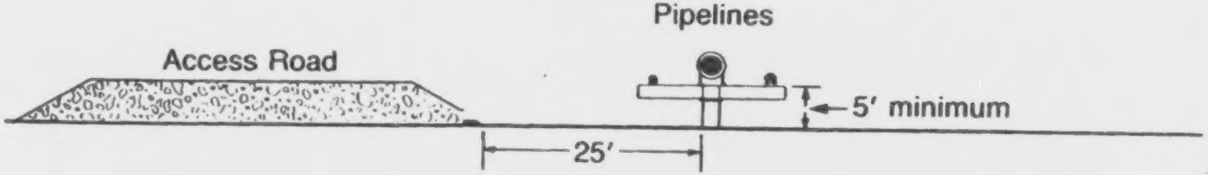
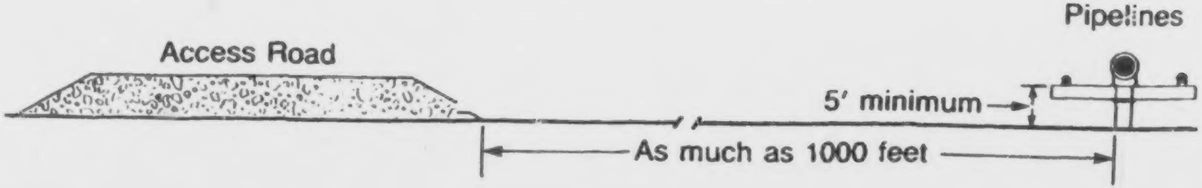

Pipelines
Access Road
5′ minimum
25′

Exhibit 7


Pipelines
Access Road
5′ minimum
As much as 1000 feet

The CHAIRMAN. Thank you very much, Mr. Weeks. And finally, Mr. Thomas Cook from Chevron.

STATEMENT OF THOMAS COOK, EXPLORATION REPRESENTATIVE FOR ALASKA, CHEVRON, U.S.A., INC.

Mr. COOK. Good morning, Mr. Chairman, and Senator Murkowski. I appreciate being here on behalf of Chevron.

I have a dry subject to talk to you about this morning. It is the regulatory framework that we deal with commonly in Alaska for all of our oil and gas operations. But it is an important subject.

And I would like to talk to you for a few moments about the existing regulatory framework and process as it applies to the most fundamental of our operations, that of drilling an exploratory well on the North Slope.

And with that remark, you will have to keep in mind that this same process extended to development and to major projects is even more pervasive and comprehensive than what I will describe here very briefly.

Over 250 wells have been drilled, exploratory wells have been drilled on Alaska's North Slope. Chevron has drilled 16 of these wells, the location of which I have shown on an attachment to my prepared testimony.

Many of these wells are drilled in environments similar to that of the Coastal Plain of ANWR, and therefore are relevant in terms of their history. And most exemplify the types of wells that will be required if this area is to be assessed and evaluated.

Now, yesterday, one of the panelists asserted that once an operator acquired an oil and gas lease, he essentially had a hunting license and freedom to drill at will. Uncontrolled drilling, I believe, is the expression he used.

That is just not true. When we acquire an oil and gas lease, we acquire a bundle of obligations and we are mindful of those from the moment we start competing for that right. Just drilling an exploratory well typically requires six to nine months to acquire the necessary permits.

You might describe it in terms of man-years, because the effort involved in preparing the paperwork, the documentation, typically will involve anywhere from two to four man-years of labor and research and special studies. Again, just to drill an exploratory well, an operation that I will assert has very little significance in terms of impact.

And I am pleased that you will be coming to Alaska this summer, because I believe that you will have the opportunity to see evidence of a well drilled by Chevron near the Coastal Plain, and I believe it will be quite evident that the impacts from this type of project are very minimal, almost to the point of insignificance.

Now, all of the regulatory framework that we deal with, except for the miner permits, really address the question of air and water quality protection, the protection of esoteric values, the protection of fish and wildlife habitat, and the protection of wildlife from disturbance and harassment.

The most basic of the permits that we deal with is the Corps of Engineers section 404 permit, which regulates the placement of dredge and fill material to the wetlands of the United States, or the waters of the United States, which now includes wetlands.

[The prepared statement of Mr. Cook follows:]

STATEMENT OF THOMAS COOK
ON BEHALF OF CHEVRON U.S.A. INC.
BEFORE
THE SENATE ENERGY AND NATURAL RESOURCES COMMITTEE
HEARING ON THE ARCTIC NATIONAL WILDLIFE REFUGE

June 12, 1987
Washington, D.C.

Good morning Mr. Chairman and members of the Committee. My name is Thomas Cook and I am employed by Chevron U.S.A. Inc. as Exploration Representative for Alaska. I appreciate this opportunity to testify before the Committee on behalf of Chevron. Chevron strongly urges the Congress to pass legislation to allow for oil and gas exploration, development, and production on the Coastal Plain of the Arctic National Wildlife Refuge (ANWR).

As its part of today's industry panel presentation, Chevron has been asked to provide the Committee with an overview of the existing legal and regulatory framework governing oil and gas exploratory operations in the Alaska arctic. The regulatory program appropriate to petroleum exploration and development on the ANWR Coastal Plain is largely in place. The established regulatory framework for managing operations on the Kenai National Wildlife Refuge where petroleum operations have continued for thirty years and on State and Federal lands of the North Slope could serve as models for regulating industry activities on the Coastal

Plain. Existing programs are comprehensive and adequate to ensure, along with industry's proven engineering and environmental practices, environmentally compatible operations.

In recent years, Chevron and industry have drilled numerous remote wildcat wells on Alaska's North Slope. The locations of Chevron's exploratory wells are shown on the index map attached to my statement. I would like to point out that many of these remote exploratory wells have been drilled in areas which are similar to the environment of the ANWR Coastal Plain. From an operational and logistical standpoint, these drilling operations are representative of the type of exploratory wells which will be undertaken on the Coastal Plain, if the Congress authorizes the area to be opened to exploration, development, and production.

These wells, which have been drilled on Federal, State, and native-owned lands, have been subject to a complex combination of established Federal, State, and local regulatory requirements. While we sometimes question the justification or need for particular regulatory requirements, most are well-conceived and serve to assure that operations are conducted in a manner which protects the arctic environment and its important wildlife resources.

We have carefully reviewed the Arctic National Wildlife Refuge Coastal Plain Resource Assessment and Final Legislative Environmental Impact Statement (Final Report) issued by the Secretary of the Interior on April 20, 1987, and we note the following statement:

> Any authorized oil and gas operations and related activities would comply with all applicable Federal and State laws and regulations, as well as with any special laws the Congress passes or regulations promulgated by the Secretary of the Interior to govern activities on the 1002 area. (p. 110)

With this assumption that any oil and gas operations which may be allowed on the Coastal Plain will be subject to all established laws and regulations, it might be useful to have an overview of the existing regulatory framework and process for a typical arctic exploratory well. In my judgment, the multiple levels of review address every legitimate concern for the environment and its wildlife.

In the arctic, the construction of the drillsite and mobilization of the rig and supporting facilities take place in the winter when conditions allow operations without damage to the tundra. Exploratory drilling in the arctic requires heavy construction equipment to build a drilling pad, reserve pit, ice/snow roads, and a temporary airstrip. Once the drillsite is constructed, the drilling rig, camp, and other support facilities are moved onto location by aircraft or specially designed vehicles with low ground pressure. After drilling is complete, equipment is removed and rehabilitation is undertaken. Little evidence of the operation remains after the project is finished.

Before any of the activities associated with drilling an exploratory well can be undertaken, the operator must acquire numerous permits and approvals. A typical plan to drill an arctic exploratory well generally requires 6 to 9 months just to acquire the necessary permits and approvals. From an oil industry perspective, permitting schedules include the time required to prepare the appropriate documents, environmental and engineering analyses supporting the applications, and the processing, review and public input schedules specified in the regulatory programs.

Over a dozen permits, plans, and approvals are required to construct the necessary pad and reserve pit and drill a well on frozen tundra. At the Federal level, the principal regulatory agencies with authority over arctic drilling, depending upon location, are the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Environmental Protection Agency, and in many cases the National Marine Fisheries Service. These Federal agencies all have various programs for the purpose of protecting air and water quality, minimizing impact to the tundra, protecting wildlife habitat, and avoiding disturbance and harassment of wildlife. Most of these agencies require a detailed description of the planned operation and each agency has the broad authority to impose special requirements on a case-by-case basis.

In many cases, applications are subject to public notice and the opportunity for public comment on the proposed operation. Further, under the provisions of the Fish and Wildlife Coordination Act and various Memoranda-of-Understanding between agencies, there are requirements for broad interagency review of a single application. For instance, under the Corps of Engineers regulation of the placement of fill material on wetlands, the U.S. Fish and Wildlife Service, the Environmental Protection Agency, and the National Marine Fisheries Service are given the opportunity to provide comments and recommendations on the requested permit. Under this program, the Environmental Protection Agency has ultimate veto power over a proposed approval by the Corps of Engineers.

At the State level, the Division of Governmental Coordination, the Departments of Environmental Conservation, Fish and Game, Natural Resources, and the Alaska Oil and Gas Conservation Commission all have comprehensive regulatory authority over industry operations. The State of Alaska has recently implemented new approval procedures to assure consistency with the Alaska Coastal Management Program and to provide for broad interagency and public review of oil and gas activities.

Any project which requires a Federal permit, or two or more State permits triggers this comprehensive interagency review at the State level. This comprehensive review process is administered by the Alaska Division of Governmental Coordination and requires formal review of all projects by the Departments of Fish and Game, Environmental Conservation, and Natural Resources. Additionally, the regulations for the program provide for formal involvement by the local Coastal Management District. For operations in the Alaska arctic, this requirement gives the North Slope Borough effective regulatory authority over operations. Also at the local level, the North Slope Borough has asserted broad regulatory authority through its Land Management Regulations.

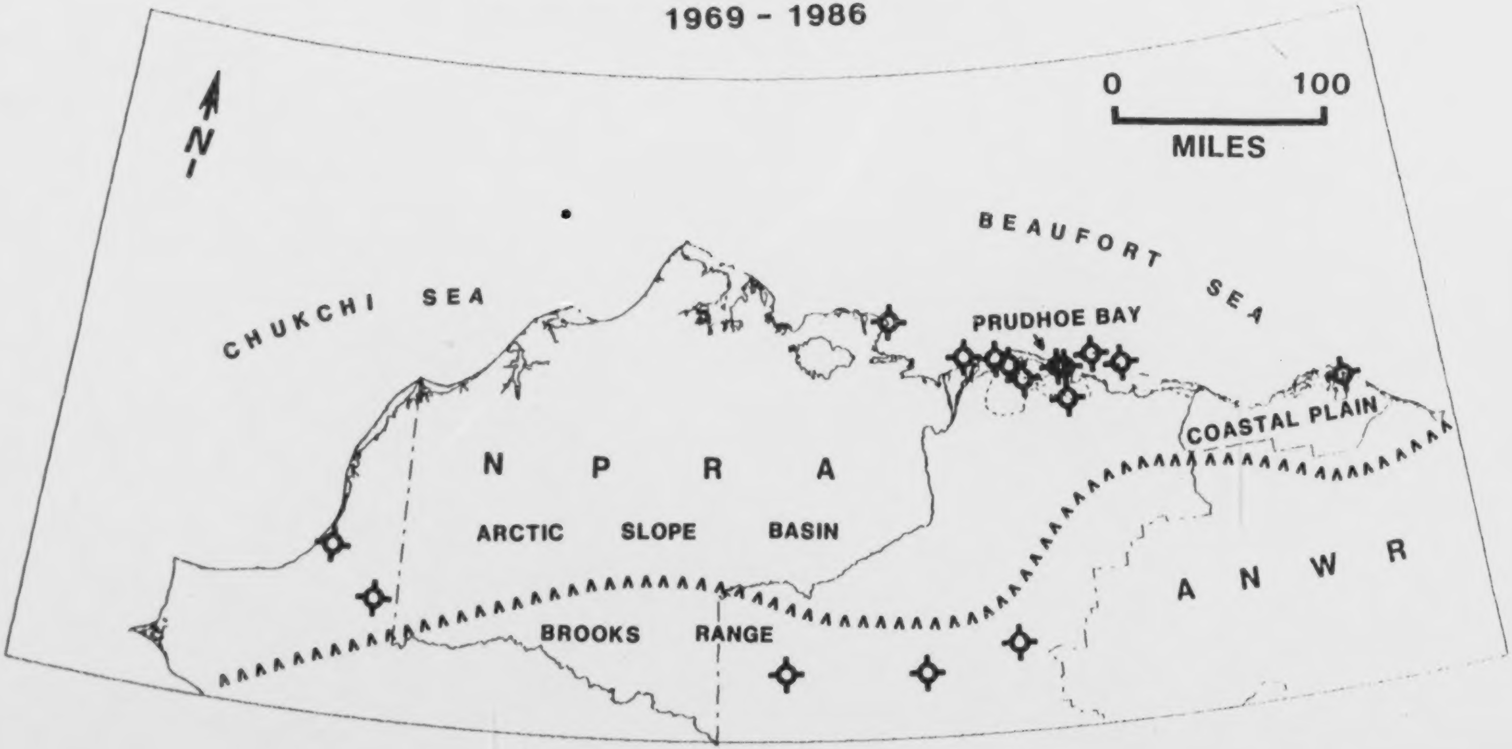
Throughout the review process various Federal, State, and local entities are afforded the opportunity to place numerous requirements on a proposed plan to drill an exploratory well. These requirements often take the form of seasonal restrictions on operations to protect migratory waterfowl, caribou calving, subsistence hunting and fishing, and other important wildlife resources and habitat.

As noted on page 5 of the Final Report, "...more than 36 Federal and 5 State of Alaska laws, and 111 separate regulations found in 6 separate titles in the Code of Federal Regulations apply to oil and gas activities in Alaska." This complex regulatory framework is more than adequate to assure the protection of wildlife and the environment of the ANWR Coastal Plain.

In closing, I would like to point out that we work with agency personnel to provide them with access to our operations. All operations are carefully monitored by agency personnel often at considerable expense to the operator. After the conclusion of operations, an approved rehabilitation program is undertaken. In many cases, industry undertakes follow-up studies and field work to assure that there have been no adverse impacts to the environment and wildlife.

Thank you for this opportunity to comment on this important issue.

CHEVRON EXPLORATORY WELLS
1969 - 1986


N
0 100
MILES
CHUKCHI SEA
BEAUFORT SEA
PRUDHOE BAY
N P R A
ARCTIC SLOPE BASIN
BROOKS RANGE
COASTAL PLAIN
A N W R

The **Chairman**. Mr. Cook, let me interrupt you at that point.

Mr. **Cook**. Yes, sir.

The **Chairman**. I have read your statement. It is a good statement, and I would like to get on with questions if we can.

You say in your statement that you drill these in the winter, and that you bring in your equipment necessary to build a drilling pad, reserve pit, ice/snow roads, and a temporary airstrip, and that you move onto location by aircraft or specially designed vehicles with low ground pressure.

By the way, has any thought been given to the air hover device? What we call the LCAC for Arctic drilling?

Mr. **Cook**. I think Mr. Herrera might comment on this more directly, but I believe we have experimented with that. Chevron has not used the hovercraft directly in its operation, sir.

But I believe there have been some experiments in the Arctic using this to mobilize, to drill sites——

The **Chairman**. The Soviet Union is well along in those for military use.

Mr. **Herrera**. That is correct, Mr. Chairman. Most of them are built in Finland, actually, but they supply the Soviet Union with all sorts of rather imaginative designs of hover platforms.

We spent probably five or six years in the Alaskan Arctic trying to utilize hover platforms and hovercraft. We have had one up there for that period of time, which was not self-propelled.

So we propelled it by every means known to man, including pulling it with a helicopter, fully loaded with all field equipment. We then imported a hovercraft which was designed by the U.S. Navy to carry tanks, and modified that for Arctic use.

We had it up there for a year running summer and winter to ascertain its practicality. And while we kept it going, and it sort of worked, and it was rather exciting to roar over the sea ice about 90 miles an hour in pitch black, nevertheless we deemed that it was not terribly practical and certainly not very economical. So those experiments have come to a close at this time.

The **Chairman**. When were those experiments done?

Mr. **Herrera**. I think they were terminated about 18 months, two years ago.

The **Chairman**. Because I think they are having pretty good success with what they call the LCAC, I think that is landing craft air cushion, it stands for. They make them in New Orleans. We have wide experience down there in drilling over the ice.

Senator **Murkowski**. I understand some of the problems were the cut banks that are associated with the rivers, and the hovercraft would be moving along very nicely, and then come to a cut bank and could not recover quite fast enough.

The **Chairman**. Well, the Soviet crafts can jump a 10 foot cut bank, they say. Maybe more than that. I know that it is at least 10 feet. Our LCAC's may not be able to do that.

You say here that little evidence of the operation remains after the project is finished. Yesterday we heard testimony to the effect that, the statement that you can go in and explore on ice roads in the winter and the frozen tundra and not leave any scars is really not correct.

First, because there must be such mining of gravel, that these leave permanent scars, even if you explore and do not find anything and move off.

And secondly, because of the requirements for water, for building the ice roads, that you would have to dam up the rivers or you would otherwise have to take actions to secure that much water for ice roads, that it would permanently scar the land.

I think the razor blade over the face of the Mona Lisa was used. Would you respond to that, either Mr. Cook or Mr. Herrera?

Mr. COOK. Mr. Chairman, I would like to comment on that, particularly with regard to the KIC No. 1 well, which is immediately adjacent to the Coastal Plain.

That was a winter operation conducted over two seasons, mobilized entirely over the sea ice during winter, and supported, and the rig itself was flown in to an ice airstrip.

The amount of surface impacted by the location, less than seven acres for the drill site, and the reserve pit. We had an ice road to a water supply, a local lake, an airstrip capable of handling Hercules aircraft.

The CHAIRMAN. You say there was a local lake?

Mr. COOK. Yes, sir. There was in this instance a fairly deep water lake that did not freeze to the bottom, very adequate water supply.

I might mention that we surveyed that lake for fish populations, and found that it had no significant resident fish populations. It was not connected to the sea or anything. And that was approved as a water supply.

The CHAIRMAN. How about at ANWR? What would you do for water there?

Mr. COOK. I think there are a variety of ways of doing that. In the exploratory phase, desalinization, accumulation of snow, use of snow melters, hauling water is a possibility.

It is the same problem we have in Prudhoe Bay, and it will be handled the same way, through that kind of innovation.

The CHAIRMAN. How about gravel?

Mr. COOK. Gravel is widespread in that area, as indicated by the shotholes that were drilled in conjunction with the seismic program.

Again, there are alternatives, at least in the exploratory phase to the use of gravel, and we implemented one of those alternatives at the KIC No. 1 drill site. No gravel was used to prepare that pad.

The CHAIRMAN. By the way, I would say both to this panel and to the environmentalists who testified yesterday, that we do envision more hearings.

And I would hope that the next hearing we have, we would get environmentalist representatives on one side and the oil company representative on the other side, and then we will get various, we will try to define those differences.

Such as, can you explore in the winter without harming the environment? And have the issue fairly closely delineated. Another question might be, will the caribou herd be hurt?

Air quality. And have these as fairly discreet questions, fairly focused questions, so that we can have the interchange which that kind of debate can bring us. And obviously this is one of them.

Because the statement of the environmentalists yesterday sounded very plausible and very logical, and your statement sounds very plausible and very logical, and we need to get two of you there and say, aha, but you did not think of this or that. We would not do that for the rhetoric flourish, but really to examine these questions.

Now, on that subject, yesterday we were shown, in Mr. Hair's testimony, he pointed out that the record has not been quite so good, he talks about a dump here that was cleaned up only after the Alaska Department of Environmental Conservation doggedly pursued the issue.

And by the time the cleanup ended in mid-1983, 58,000 gallons of liquid waste and 1,600 cubic yards of contaminated solid waste, and 14,000 drums had been removed. He attaches pictures of some of the damage done.

Mr. Herrera, I wish you would look at these and comment on those, if you have any comment, if you know what the pictures are and if you have any defense.

Mr. WEEKS. Mr. Chairman, may I answer the question please? Rather than Mr. Herrera?

The CHAIRMAN. Yes.

Mr. WEEKS. Let me first comment on the first issue you addressed, which was the 14,000 and some odd drums. I will submit to the Committee two photographs, one a before and one an after photograph of the site in question.

You will note that that is a state lease that was leased to a company called North Slope Salvage, Inc. North Slope Salvage had a contract with Arco and Standard to dispose of used drums of various products that we use in the operation.

That lease is in the Dead Horse area, and the terms and conditions are governed by the State of Alaska Department of Environmental Conservation.

Once Arco and Standard discovered that North Slope was not running a prudent operation, we voluntarily stepped in, although we had no obligation, and cleaned up the site. And as you can see from the before and after pictures, I think a fairly reasonable job was done at that.

We were not doggedly pursued. We voluntarily did that. I think we spent in excess of $2 million on that activity.

The CHAIRMAN. Can we be assured that that kind of thing would not occur again? And how would we be so assured?

Mr. WEEKS. Let me discuss a concept that I think would have a lot of appeal for ANWR.

In 1969 the State of Alaska leased land in the Dead Horse area, and Dead Horse is a service industry community south of the Prudhoe Bay area near a state-owned landing strip. The state leased that property to private firms, oil company service contractors, suppliers, et cetera, who set up an operation to support the oil development at Prudhoe Bay.

Now those leases are state leases, administered and policed by the State of Alaska. And I do not want to throw stones at the State of Alaska because I think that was probably a prudent thing to do at that point.

Looking at the Dead Horse experience, there has been overbuilding, speculation. Gravel paths were built that probably did not need to be. They sit there idle now. Facilities are idle, because of the downturn in the economy.

When we started Kuparuk we were not entirely comfortable with the Dead Horse concept. So we initiated dialogue among the oil producers, the service companies, contractors, Federal, state, and local governments, and came up with the Kuparuk Industrial Center, or another KIC.

The Kuparuk Industrial Center is a North Slope Borough owned facility that is in the Kuparuk area. It is operated by native corporations. And its sole purpose is to be the Dead Horse, if you will, of the Kuparuk unit area.

Services and land access is controlled by the borough. It is leased by the borough to the various users. And this planned approach mitigates many of the things that have happened and are happening in Dead Horse. So I would envision something similar to that for ANWR.

The CHAIRMAN. All right. Mr. Herrera, we heard yesterday that air quality is a special problem in the North Slope because there is such low rainfall that the air is not washed, in effect, by rains. That because of the cold and the density of the air, pollutants tend to hang in the area.

There is already a phenomenon known as Arctic smog. I asked, what would be the result of this? And they said, the data is very sparse so they do not know. There is a great deal of uncertainty.

But the fear is that it could affect in a real way the whole food chain, not only of the Arctic but of other areas. What is your response to that? The whole ecosystem could be at risk.

Mr. HERRERA. Well, they obviously described the physical conditions accurately. However, they missed out one thing, and that is the average wind speed at Prudhoe Bay is 13 miles an hour yearround, 365 days a year, which tends to ameliorate some of the other heavy air, colder weather aspects of it.

I guess the proof of the pudding is in the eating, Mr. Chairman, and the results of the measurements indicate in fact that the air quality is not bad. And those measurements have not been intermittent, as has been suggested, as I indicated in my testimony.

They have been very thorough and ongoing, ever since 1979. And the current measurements once again back up the earlier indications that the only air quality contaminant of any concern at all is NOx, and that is low compared with almost everywhere else in the country.

The CHAIRMAN. I think they testified that the air has been monitored only for one year.

Mr. HERRERA. They testified that the air was monitored in 1979, 1980, which it was. They did not add that every new item of pollutant equipment has been tested in the interim, and now there is another full year of testing, ongoing at this time, which started in the middle of last year.

The CHAIRMAN. Now, Sadlerochit is regarded as a reservoir. Does that have different structures in it? It has different traps in it, does it not?

Mr. **Herrera**. The Sadlerochit is a sandstone formation, which is a potential reservoir for oil. That is correct. And it is the major producing formation——

The **Chairman**. I am talking about the one at Prudhoe.

Mr. **Herrera**. At Prudhoe Bay. That is right. It so happens that that same formation is undoubtedly present in the subsurface of the 1002 area.

We know that with a degree of certainty, both from the geophysical records that we have obtained, as a result of interpreting the seismic. And also from the fact that the Sadlerochit Mountains, which is the location of the type section of that formation, occurred just outside the Coastal Plain of the 1002 area in ANWR.

And we can examine the rocks actually as they outcrop in the mountains at that location, and find that they have more or less identical physical characteristics to those that we see bearing oil at Prudhoe Bay.

Now the Sadlerochit Mountains are only a few miles away from where we might be drilling underneath the Coastal Plain. We know those rocks swoop down beneath the ground, and therefore we have got one excellent reservoir to aim at straightaway. There are many others also with similar characteristics.

The **Chairman**. I guess my question is, must you drill all 26 to determine whether or not there is oil in recoverable amounts?

Mr. **Herrera**. No. What I was trying to intimate is that it is not going to be easy to find oil there, even if there is a lot of it. One has to prepare to go for the long haul.

It might take 26, 30 exploratory wells before we find that big field. We are likely to find smaller fields along the way, certainly. But they will probably be subeconomic. I guess if we have been living right we might hit it first time.

There is a chance of that, and it is just a statistical chance, and there is a lot of luck involved. I am the first to admit that as a geologist.

The **Chairman**. Well, if there were oil in all of these formations, would you call that one reservoir?

Mr. **Herrera**. The structures that you see on your map, the 26 structures, are geologically different. You get variations in the geology from south to northwards, as you go towards the coast, for example.

And probably the reservoirs that might contain oil in the northern fringes of the area are going to be different ones than further south. So your geology is very varied in that area, and the fact that you get oil in one reservoir and one structure does not indicate that the others also have potential.

The **Chairman**. Or vice versa?

Mr. **Herrera**. Yes.

The **Chairman**. Well, in a sense you must drill all 26 to rule them out. I guess if you had 25 and they are all dry, that number 26 you can figure would not have enough recoverable oil to make it economically feasible.

But just as a matter of petroleum geology, I mean you know you have got the rocks, you know there is oil in the area, you know all of those things. And the real question is, do you have a trap?

And you have really got to drill it to determine whether there is a trap.

Mr. **Herrera**. That is correct. And also whether oil has actually migrated and stayed in that trap, yes.

But you are right. You walk away from that area with your heart in your mouth, and say, I am not going to drill any more wells, because the geology is complicated, yet the potential is very high.

So you do it at your peril. You keep on drilling, assuming that you get some encouragement along the way.

The **Chairman**. Dr. Maki, you talked about the experience at Prudhoe Bay and Dead Horse, that you displaced some of the caribou there, and that you can therefore demonstrate from Prudhoe Bay that it is not inconsistent with the health of the caribou herd.

Were there calving areas at Dead Horse and other areas there that were displaced?

Dr. **Maki**. Yes, sir. If I may back up just a half a step, Mr. Chairman, I would like to add another perspective on the air quality issue.

The data that Mr. Herrera referred to, I think, are very important and very key to addressing the allegations of ecological impacts.

All of the monitoring data from the most recent field monitoring program begun last summer, this is the most recent data, 1986 and 1987 information, from both near field and far field monitoring stations, this is in both Kuparuk and the Prudhoe field, these are sites where fully developed fields now exist, where we have the worst case scenarios possible to monitor.

And all of that data has shown us now for the last year that the values of specific pollutants are significantly under the NAAQS levels. These are the National Ambient Air Quality Standards, developed and promulgated by the EPA for the protection of human health and the environment.

And the values that we have reported and found, monitored, quality assured and quality controlled through this monitoring program, clearly indicate that we are well under the NAAQS standards.

So from the standpoint of ecological impact, we think they are minimal. No doubt, there is an incremental addition. It is not native tundra. We have had a subtle addition of some of these particular pollutant materials.

But they are well under standards that are designed for protection of human health and the environment.

The **Chairman**. By the way, is there any acid rain on the Arctic?

Dr. **Maki**. Well, again it is a function of the very light rainfall to begin with. We have not monitored any incremental additions of acid rain. I am not aware of any data that indicates that it is a problem.

The **Chairman**. No indication of acid rain?

Dr. **Maki**. I am not aware of any data. Backing up now to the caribou question. The Central Arctic Herd has historically occupied the area of Prudhoe Bay and Kuparuk.

We know that calving distribution has occurred in the areas immediately south of the bay, in the Kuparuk field proper. Calving continues in the Kuparuk field to this day.

We may have displaced caribou calving from some of the areas in the Prudhoe Bay area proper. We just simply do not have the data to adequately quantify the degree of calving that has occurred in that area.

The CHAIRMAN. How large is the Kuparuk field?

Dr. MAKI. Help me with that, Jim?

Mr. WEEKS. Reservoir or area-wise?

The CHAIRMAN. Area-wise.

Mr. WEEKS. It is about 200 square miles.

The CHAIRMAN. And how much calving goes on there now?

Dr. MAKI. Well, there is a portion of the herd, again, as I tried to point out in my testimony, it varies considerably from year to year.

There are calving grounds located in the southern area of the Kuparuk field. It is hard to quantify from a year to year basis exactly how many animals are involved.

The CHAIRMAN. Is there as much calving in the Kuparuk area, this 200 square miles of that, 14 by 14, is it square?

Mr. WEEKS. It is triangular shaped, principally.

The CHAIRMAN. Is there as much calving going on there now as there was before the drilling?

Dr. MAKI. Again, very hard to quantify what occurred there before, with historical data just very weak to support it.

But if we back up and we look at the growth of the Central Arctic Herd, we are encouraged that, yes indeed, calving is occurring, and occurring in increasing frequency in the range of the Central Arctic Herd, as monitored by the growth of the herd.

The CHAIRMAN. Well, in the Department of the Interior's report, in their first draft they said that there will be some diminution in the size of the herd and that up to 40 percent of the herd will be displaced at calving time, if I recall the statement correctly.

It was ambiguous first because you could not tell whether they were talking about a 40 percent diminution in the herd, or 40 percent would be affected by the displacement. But in any event, in that initial statement, they did say they could be 40 percent displaced.

That phrase was not carried forward in the final draft. And that was a very controversial omission. Now, first of all I would like you to comment, can you say, on the basis of what has happened in Kuparuk, that this is evidence that drilling and production does not interfere with calving? Or is the database so limited in this one field that we do not know?

Second, do you know the extent, or do you have an opinion to the extent to which it would either displace or disturb or otherwise result in the diminution of calving? That is about five questions in one.

Dr. MAKI. Again, the key gets back to ANWR and the Porcupine Herd. As we tried to indicate in the——

The CHAIRMAN. First of all, on Kuparuk. Does that prove that drilling does not interfere with calving?

Dr. MAKI. I think that the data would support the fact that we have brought about a displacement of calving activity. It is just not quantifiable, and we do not have adequate data one way or the other.

But I think intuitive reasoning would indicate that a displacement of some finite magnitude has indeed occurred.

The CHAIRMAN. All right. Tell me why you make that statement.

Dr. MAKI. Well, it is the same reason that we do not find whitetail populations here on the Hill as there was 200 years ago.

The CHAIRMAN. I thought you said that there is calving in the Kuparuk.

Dr. MAKI. Well, they have been displaced to some degree, but we still calving continuing on the southern edge of the field where they have historically calved.

They are not calving in the middle of the oil field development proper. No, that is not occurring.

The CHAIRMAN. How much is the displacement?

Dr. MAKI. Again, I do not believe data on one side or the other can give you a good——

The CHAIRMAN. Intuitively, how much? When you have got 200 square miles, the square root of that is about 14 miles. So it is an area about 14 by 14. There is still calving in there. I know it is not square.

But, they are not in the middle. They have moved somewhere. Do you have any view, any intuition as to how much——

Dr. MAKI. Well, certainly, intuitively, we feel they have indeed moved. We are seeing continued calving in the area immediately south of the Prudhoe field.

Again, the best barometer of the impacts is the continued growth of the herd. If we——

The CHAIRMAN. I understand that. The herd has tripled in size. How far do they calve from the nearest rig or edifice or whatever?

Dr. MAKI. Probably we are seeing, within a matter of 5 or 6 miles to the south, we are seeing some of the concentrations occurring.

The Franklin Bluffs area immediately south of Prudhoe Bay is probably 12 to 15 miles from road areas.

Mr. HERRERA. Mr. Chairman, could I have a shot at that?

The CHAIRMAN. Yes, indeed.

Mr. HERRERA. The only systematic scientific study of impact on displacement on caribou from oil field structures was carried out by two State of Alaska biologists.

They did a before and after survey of an area, in fact in the Milne Point-Kuparuk area, just in this area you are talking about, four years before a road was constructed, which would carry all field traffic, and four years afterwards, to see what the effect of that road would have specifically on pregnant females that use that area.

What that study did, and this is the only study which everybody agrees was well put together, and has been subject to peer review. What it showed very clearly was there was some displacement of caribou, as perhaps common sense would suggest, from the road, after the road was built, compared with the pre-construction period.

Pregnant cows tended to move away from the vicinity of the road, out to a distance of two kilometers from it. Thereafter, there was no difference between the statistics before and after.

So, outside of the two kilometer area, the cows did not take any notice of the road. In fact, if you measured six kilometers on either side of the road, and took that sort of corridor, there were far more cows in the corridor after the road was built than before.

Now, this is a product probably of there being more population, more animals in the population in that eight years of the study. But nevertheless it is a fact.

Now the displacement out to two kilometers which was noted was not a total displacement at all. There were just fewer cows closer to the road than there had been before the road was built.

So pregnant animals, who are presumably the most sensitive, were still using the area close to the road afterwards. But on the whole they preferentially tended to move slightly away from it, to the extent of two kilometers.

The CHAIRMAN. Now that would be an appropriate item to put in our debate. Resolved, that the only evidence indicates that the displacement is no more than two kilometers or the evidence of man. And I would like to see what the other side has to say on that.

Dr. MAKI. That was a study designed and conducted by the Alaska Department of Fish and Game. We have looked at it in some detail with them cooperatively. And the results of our investigations were abstracted in the final 1002 report.

The two kilometer figure, I think, is accepted by everyone as the cow and calf avoidance corridor, if you will.

Senator MURKOWSKI. Mr. Chairman, will you yield on that point?

The CHAIRMAN. Yes.

Senator MURKOWSKI. I think it fair to point out, with regard to the Central Herd, there is probably little scientific evidence of where specifically the caribou may have calved in relationship to what is at Prudhoe Bay today.

That being a given, the fact that there is displacement of some sort is, I think, a given realization. But it is important to clarify that there has been no negative impact on the population of the Central Herd, which in 1972 was about 3,500 or thereabouts, and it is now 13,000 to 14,000.

And that is the herd that has really developed around Prudhoe Bay. They have observed the pipeline. They have observed the wells, and so forth. And I think it is certainly appropriate that we reflect that the displacement has had no negative impact on the population.

The CHAIRMAN. I think the answer to that from the environmental groups is that the Prudhoe Bay herd does not primarily calve in that area. I think that is their explanation.

But I will let them speak for themselves at the appropriate time. That is why I say we want to sharpen these issues.

Senator MURKOWSKI. I wonder if the biologists would agree with that.

Dr. MAKI. The history of calving utilization in Prudhoe Bay, I think everyone does agree, has been a subject of controversy and probably the exact numbers will never be resolved. We just really do not have the data to support it.

The CHAIRMAN. I think they say that on ANWR, it is the only area in the whole region, that includes part of Canada, where they return in large numbers to precisely the same places. That calving areas vary all over the map, from Canada to Alaska.

But in this Plain area of ANWR is the place most heavily used for calving of any other, and therein lies its great sensitivity for the caribou.

Dr. **Maki**. I might add, the last few years for which we have now plotted intensive information, 1983 and 1984, indicate that utilization runs around 15 percent in this "concentrated calving area" that they made a point of.

The **Chairman**. Utilization——

Dr. **Maki**. Calving distribution of the total——

The **Chairman**. Fifteen percent of the herd in a given year?

Dr. **Maki**. Calve in this concentrated calving area. I think the field data that we have submitted would tend to support that viewpoint.

Mr. **Herrera**. Mr. Chairman, on that subject, back in my testimony you see two maps, which relate to this.

They are maps which were produced by the U.S. Fish and Wildlife Service, and they are only available for 1983 and 1984 calving distribution of the Porcupine Caribou Herd. And the maps specifically relate to calving within the so-called core calving area and also the so-called concentrated calving areas.

And what you find in 1983 is that of the total calving cows, only 15 percent were in the so-called core calving area, and 40 percent of the calving cows were outside even the concentrated calving area in that year. So they are spread all over the landscape.

In 1984, the situation is even more dramatic. Only 7 percent of the calving cows used the so-called core calving area, and 48 percent of them used areas outside the concentrated calving area.

So, the mystique of these concentrated calving areas and core calving areas is somewhat belied, at least in these two years. The only two years for which Fish and Wildlife Service have yet issued data.

The **Chairman**. Now, do we know whether the same calves return to the same spot year after year, as some birds do? Or is it likely to be a separate 15 percent that are there one year from another? Do we know that?

Dr. **Maki**. Radio-collared information from specific individuals show some preponderance to selection to the same area.

But again, there is a pure random component. Some years, yes. Some years, no. Again, trying to make the point that they will calve in a wide continuum of habitat.

The **Chairman**. What is the lifespan of a caribou? Or the productive years of a caribou calf?

Dr. **Maki**. Well, a calf born one year will migrate with the herd, the following will be termed a short yearling.

She will not be bred then until that fall. The following year she will have a calf.

The **Chairman**. And how many years can she produce?

Dr. **Maki**. Fecundity data probably indicates that they are most productive then for the following three years. Beyond that, they are lost to the population. That is an average. They are reproductive, three to four years.

The **Chairman**. They are productive three or four years?

Dr. MAKI. Yes.

The CHAIRMAN. Their lifespan is how long?

Dr. MAKI. I guess you can find literature examples where some of them have lived up to nine and 10 years. And longer, I am sure.

The CHAIRMAN. What do you call a girl caribou? A cow? A cow will frequently but not always return to the same place.

Dr. MAKI. That is valid. Data go both ways on specific radio-collared individuals.

The CHAIRMAN. How many caribou herds are there on the North American continent?

Dr. MAKI. Specifically in Alaska, depending on how you split it, there are as many as 27 succinct herds described by various calving areas and migratory patterns.

The Porcupine Herd is listed as the 6th largest North American herd. There is one other larger Alaskan Herd, 240,000 individuals in the Western Arctic Herd. And there remain four larger herds in Canada, up to 600,000 animals in one of the particular herds, the Georges River Herd in Canada.

So caribou certainly is not an endangered species by any shape or form.

The CHAIRMAN. Now, Canadians allow hunting. Do we allow hunting in Alaska?

Dr. MAKI. Yes, sir.

The CHAIRMAN. We do allow hunting?

Mr. WEEKS. Mr. Chairman, may I address that? The Prudhoe Bay area is closed to hunting by the State of Alaska.

The oil companies prohibit not only their own employees but anybody that enters the field, and we secure this with security checkpoints, from carrying firearms.

I think there was some testimony yesterday that our subcontractors and contractors are allowed to carry firearms. To the extent that they are living in the oil field and our facilities, they are prohibited from carrying firearms.

The Prudhoe Bay area is closed for hunting. I think the Kuparuk area is open for hunting, but you cannot get a gun in.

The CHAIRMAN. By the way, what is your response to the statement that the brown bear would be under great pressure, not from hunting, but because the bear might come up, there was a bear in a mess hall even described yesterday, that they would be shot because of the danger that they might present in particular situations.

Do you see the brown bear as being under pressure from this? What has been the history in Prudhoe Bay?

Dr. MAKI. The brown bear is another wildlife species where I think the habitat and carrying capacity argument can carry a lot of significance.

We have no indication that brown bear in that part of the range are limited by habitat. They do forage over very, very wide areas.

The CHAIRMAN. I do not think the claim was made that this was a peculiar habitat for them. But rather that they would get in the garbage or otherwise be a danger to humans, and that therefore they would get shot.

Dr. **Maki**. That is indeed a possibility. I talked to my wife last night. They have a grizzly bear in the hillside area of Anchorage, spotted by several hikers now.

That is a "problem bear." It runs a severe risk of being shot as a result of being a problem bear in an area where human habitation does occur.

The **Chairman**. What is the brown bear population in Alaska?

Dr. **Maki**. I really have not got a good number on that. It is on the upswing. Most of the quotations from Fish and Game indicate that it is now healthier across the entire state than it has been in many years. I do not have a good figure for you.

The **Chairman**. I know it is not endangered. What is the second category down from an endangered species?

Dr. **Maki**. Threatened?

The **Chairman**. Is it threatened?

Dr. **Maki**. The brown bear, I believe, is listed as threatened in specific portions of its range. That would be in the lower 48. It does not have that status in the State of Alaska.

The **Chairman**. There are a lot of them in Alaska?

Dr. **Maki**. There are indeed.

The **Chairman**. All right.

Mr. **Weeks**. Mr. Chairman?

The **Chairman**. Yes.

Mr. **Weeks**. You earlier referred to some photographs that were attached to Dr. Hair's testimony yesterday.

The **Chairman**. Yes.

Mr. **Weeks**. If I could I would like to describe those.

You have the photographs in front of you. The first one that is attached to the testimony is a picture of one of the gathering centers in the western operating area of Prudhoe which is operated by Standard, and over in the upper right hand corner indeed you will see a flare. And I think that was the purpose of showing the picture.

Not working for Standard or understanding exactly when the picture was taken, I cannot comment on the specific instance that might have resulted in that flare. But I would like to comment on flares in general if I might.

There are a couple of kind of flares on the North Slope. There is flares associated with startups and shutdowns of the facility, just simply because you have to relief the pressure from the vessels. There is flares associated with emergencies. When you have an emergency you have to depressure the equipment, and the only alternative is to go to flare with that gas.

And then there are operational flares, which are a result of problems with the equipment. The equipment does break down and occasionally it is necessary to flare to fix something before you can shut it down. You might shut down a piece of equipment rather than a whole plant.

All of our flare volumes of gas are permitted with the state of Alaska. We have a certain volume of gas that we cannot exceed in a monthly period. We have never even approached flaring one half of that volume.

Now, unfortunately when we do flare in certain instances it does make black smoke, but the black smoke incidents are less than half of the permitted volume. And over time I think our flaring record has been pretty good.

The CHAIRMAN. Your point is, the point you are making is very intermittent flares.

Mr. WEEKS. Emergencies and operational upsets.

That photograph is interesting. If you look at the right-hand corner, you will see the crossing ramp that was built to enhance the caribou's ability to get across the pipelines in the field.

The CHAIRMAN. I do not see any caribou in that picture.

Mr. WEEKS. Oh, you want some pictures with caribou?

The next photograph is a picture of Kuparuk, one of the production facilities there, and that indeed is a flare. And not knowing the date, it looks like it was probably associated with the startup of that facility, when you introduce the hydrocarbons——

The CHAIRMAN. That is not a burning of a waste pit?

Mr. WEEKS. No, that is a flare. I do not know if it is operational or startup or emergency, but that is indeed a flare at one of the production facilities.

The CHAIRMAN. That is gas that is burning?

Mr. WEEKS. That is gas. And the reason it is black smoke, there are heavier liquids, octanes and heptanes, in that gas that emit the black smoke.

The picture above that is probably—I have not seen this sight with my own eyes, but that is no doubt the North Slope Borough landfill at Prudhoe Bay. In fact, that landfill is an abandoned gravel mine that was used as a large source of gravel for Prudhoe.

Senator MURKOWSKI. Is that an industry pit?

Mr. WEEKS. That is operated by the North Slope Borough. In fact, we are compelled to have our solid wastes handled and removed and placed in this landfill. It is a public utility, if you will.

This next photograph is kind of interesting. That is a drum burning operation. I do not know whether it is at Standard or our side of Prudhoe or Kuparuk. And the reason we do that is because of the North Slope salvage incident. We decided we would take care of our own drums so we would not have the recurrence of that problem.

And what we do is, when the drum is no longer useful it is sent to a central location. They are staged throughout the winter. In the summertime these drums are emptied of whatever residue may be in them, they are washed, they are rinsed three times with fresh water. The washings and the rinsings are collected in a container and disposed of down our permitted well.

The drums are crushed and then they are incinerated to evaporate whatever liquids may be left in them. And then they are hauled to the North Slope Borough landfill, where they are disposed of.

The picture on top of that is Kuparuk mine site F. That is one of the mine sites that was permitted, and it is right in the vicinity of Kulubik Creek. That little body of water in the foreground is Kulubik Creek.

And what I think Mr. Hair was intending to do with this is show we did experience a washout or some washing of material from the overburden pile down onto the tundra. This activity was unfortunate, the rain and snow melt and a high moisture content in the overburden.

And what has happened is that at those two locations you see the water started flowing, took some of the embankment with it. This summer our plans have been approved to redress this surface and actually seed it in grass to stop the erosion.

I might add that the total activity, the overburden placement, the pit development, was all permitted prior to the fact.

It is kind of interesting. If you look at the upper left-hand corner you will see what looks like a plowed field, and that is a two foot area of overburden that we placed on the tundra as a reseeding experiment, to try to see how we might restore some of this stuff.

The CHAIRMAN. Did you plant cabbages or anything?

Mr. WEEKS. Well, I do not know if we tried cabbages, but we have certainly had success with a variety of grass and that sort of thing.

Thank you, Mr. Chairman.

The CHAIRMAN. It really does look like a plowed field. Was it plowed?

Mr. WEEKS. Say again?

The CHAIRMAN. I say it really does look like a plowed field. Was it in fact plowed?

Mr. WEEKS. I think there was probably a forklift with some apparatus on the back run over it. I do not think we have any plows up there.

The CHAIRMAN. Senator Murkowski.

Senator MURKOWSKI. Thank you.

Mr. Chairman, as a consequence of the hearings that we have had so far there has been a good deal of discussion over the status of the drilling in ANWR at Kaktovik, the joint venture between Chevron and the Arctic Slope Regional Corporation.

And some of my colleagues have indicated that they feel that if that information were made public, it would greatly benefit the process of determining whether or not to open ANWR. And others have indicated a concern that, if it was dry or reasons to believe that there had not been any encouragement from that well, why, it would potentially affect the likelihood of getting substantial bids in favor of the Federal Government if this Committee and Congress deemed it appropriate to open ANWR.

So you have got both sides of the issue, and I guess it would probably be appropriate if Mr. Cook, since he represents the company involved, would comment on the concern expressed by my colleagues and the fact that, you know, here we have exploration that has occurred, nobody knows what the—the Committee does not know, at least, what the results have been.

We understand you have the authority to drill two more wells. Originally you were given the authority to drill three. Why have you not drilled them? I wonder if you could comment on that, Mr. Cook?

Mr. COOK. Well, let me comment on the first question, Senator. Ours is a very competitive business, as you know. And I might mention, incidentally, that I am not privy to the information from that well.

Senator MURKOWSKI. You do not know what it is?

Mr. Cook. No, sir, I do not. It is held very closely within our company and among our partners and the landowners. It has a high degree of competitive value, and we are bound by our contractual relationship with our partners and with the landowner to maintain the confidentiality of that well.

The data were acquired at a cost of about $50 million, and the value of that information is, I guess it is hard to even assess. Certainly if we made the data public, it would have no value, at least to us in a monetary sense.

Senator Murkowski. If you have to what?

Mr. Cook. If we made the data public, it would have no value to us in a monetary sense. You see, it has a value for potential for being traded or sold, and to disclose that and make it public would destroy that value.

And it is common practice for companies to maintain confidentiality on exploratory wells. And also, the state of Alaska law provides that we can maintain the data.

Senator Murkowski. Why have you not drilled the other two wells?

Mr. Cook. I think there is some confusion there on the so-called three well limit, and I would probably best defer this answer to someone from Arctic Slope Regional Corporation.

But my understanding is that we are not restricted in the number of wells that we can drill there.

Senator Murkowski. The permit gave you three.

Mr. Cook. Well, I think the exchange—and that is the agreement between the Arctic Slope Regional Corporation and the DOI. Now, we are not party to that. That well had a provision in there on certain terms under which lands could be turned back if they were prohibited from drilling, and it was tied somehow to a first, second, and third well numbers.

But I do not believe that that in fact affects the number of wells that Chevron and its partners might drill there. As far as the first well that was drilled, it was one way in which we could satisfy our obligation to the landowners, and there was a diligence requirement there, Senator.

Senator Murkowski. Well, I suppose there is not much inducement to drill unless you have assurance that, if you find substantial economic recovery potential, that you would have to have assurance that you could take it out.

Mr. Cook. I think that is really the crux of it.

Senator Murkowski. Now, without the Congress moving on this legislation, that oil could not be moved out if indeed there was oil there.

Mr. Cook. That is exactly right. We are not allowed to produce those lands.

Senator Murkowski. So this is the application to the matter that is before us. If ANWR were opened and you did have oil there, then there would be a route to take it out.

Mr. Cook. Yes, sir. And there would be an incentive to continue drilling.

Senator Murkowski. Mr. Patterson, I am interested in the economics currently involved in the general Prudhoe Bay development and your company's decision, I gather, to close the Milne Point, which was a small adjacent field a step out from Prudhoe Bay.

The tremendous costs—I do not know how much you put into development of Milne Point. I assume that it is not exhausted by any means. But you shut it down. Why?

Could you tell us the decisions of how much was spent, how much oil is still left, or how much you produced, why you shut it down?

Mr. PATTERSON. Yes, Senator, I would be pleased to. This I think would probably be also relevant to Mr. Herrera's comment earlier about the time frame. Milne Point was discovered in 1970 by Hamilton Brothers. Ten years later, they relinquished it and, as you well know, it has only recently come on for production.

So we are looking at almost a 16, 15 to 16 year period of time for that development to have occurred. Our investment there is in the order of around $325 million. The net investment to Conoco of that was about $182 million.

The project was first approved in January of 1984, and we started our production up on November the 2nd, 1984. And we have 24 producers that we have drilled there.

Senator MURKOWSKI. 24 wells?

Mr. PATTERSON. Yes, sir, 24 producing wells. 16 injectors, one gas storage well—we reinject the gas—and three water injector wells, so that we are getting maximum recovery out of the reservoir by starting a water injection program early on.

The average rate of production for these wells is about 850 barrels of oil per day per producer. The gravity is about 22.5 degrees API. And our daily production level is around 22,000 barrels of oil per day, which—I might add that in 1986 we started to curtail that back to a level of about 10,000 barrels of oil per day.

And there was a good reason for that. As you are well aware, oil prices were declining very rapidly during that period of time and we suddenly realized that for every barrel of oil that we produced it was costing us money.

Let me put that into proper perspective. Also, it cost us about $7.68 to move the oil from Milne Point to Valdez. It costs another $1.68 to move that oil onto the West Coast of Alaska. So we are looking at $9.56 in transportation costs, not counting the lifting costs and other costs associated with regard to royalties, et cetera.

So at ten dollars a barrel for the oil, it is quite apparent that we were losing substantial money. We went to the proper state and Federal people and requested approval for a warm shutdown on that field, and that is where we stand right now.

Senator MURKOWSKI. So you have got an investment in the field yourself of $182 million, a total of $325 million or thereabouts?

Mr. PATTERSON. Senator, that is correct.

Senator MURKOWSKI. And how much have you produced of your reserves?

Mr. PATTERSON. Well, a very, very limited amount. The reserves are probably in the order of about 130 million barrels recoverable here. And of that amount, we only produced for a short period of time. So I would have to multiply it out at 22,000 barrels of oil per day to see exactly what that figure would be.

But the major portion of the reserves remain there to be produced.

Senator **Murkowski**. So it is strictly a matter of economics as far as you are concerned. The infrastructure is in, the reserves are there, but you cannot make any money at this price, so you shut it down?

Mr. **Patterson**. Absolutely correct, sir.

Senator **Murkowski**. And I assume the Prudhoe Bay situation, since much of the cost of development has already been amortized, that the higher returns—that the industry can generally survive the price decline at this stage, even though I suppose you would have to sharpen up your pencil a little bit.

Mr. **Patterson**. Senator, that is absolutely correct. It is costing us $1.1 million per month to keep that field in the shut-in, warm shut-in position. That also includes about four, a little over $4 million ad valorem tax.

Senator **Murkowski**. Do you have any specific dollar amount that the oil would have to get up to before you would reactivate the field?

Mr. **Patterson**. Certainly if oil were to reach a $30 level, we would be in a position to start production.

Senator **Murkowski**. Well, between what it is now and $30, you do not have a magic figure for the Committee?

Mr. **Patterson**. Over 24 we would start looking at it very carefully.

Senator **Murkowski**. Well, that is contrary to what some people suggest will be the variances of what we can expect. I do not know, some experts have predicted $15 to $20 as being the peak and valley that we are going to be looking at. But experts are a dime a dozen.

Mr. **Patterson**. We are very humble when it comes to predicting oil prices, sir.

Senator **Murkowski**. Well, that is because you are experts at it. That is why you have to maintain that humility.

Mr. Weeks, you indicated that half the reserves had been transported from Prudhoe Bay to market. Is that half the reserves—you are telling me that half of Prudhoe Bay has been developed and sent to market and the other half remains, is that what you are telling me?

Mr. **Weeks**. Yes, that is basically it. And I think the five billionth barrel of oil from Prudhoe went down the line in mid-April, and roughly ten billion barrels recoverable in early estimates—about half.

Senator **Murkowski**. So you are moving what, 2 million barrels a day now or thereabouts?

Mr. **Weeks**. That is the total pipeline. About 300,000 of that comes from Kuparuk. Lisburne is contributing 45 or so. There is 50,000 barrels a day of NGL's coming from Prudhoe. And it all adds in about 1.6, a little over, coming from Prudhoe.

Senator **Murkowski**. Now, that is existing technology.

Mr. **Patterson**. Yes, sir.

Senator **Murkowski**. That is in place, producing at Prudhoe Bay. Tell me a little bit about West Sak, which I understand is estimated to have the largest reservoir of oil in place, somewhere between 15 and 40 billion barrels of oil in place, which lies just above the Prudhoe Bay field, the West Sak field?

Mr. **Patterson**. We like the number for—this is in place oil, not related to how much we can get out—for West Sak of between 18 and 22 billion barrels.

Senator **Murkowski**. Yes, I am referring to the report of the State Department of Natural Resources. It indicates the West Sak field to contain estimates—but everybody's entitled to their estimates.

Mr. **Patterson**. It is still a big number.

Senator **Murkowski**. A big number.

Mr. **Patterson**. And you know, that is in a class with Prudhoe Bay. Prudhoe had 22 billion barrels originally in place.

Senator **Murkowski**. This is above Prudhoe Bay, is it not?

Mr. **Patterson**. It is shallower.

Senator **Murkowski**. It is shallower than Prudhoe Bay, the same area. In other words, the infrastructure is already there, the pipelines, the gathering lines, and the oil is above it.

Mr. **Patterson**. Well, the oil is a little above the Kuparuk. West Sak is located about between 3,000, 3,500 feet, principally in the Kuparuk area. The Kuparuk reservoir is about 6,500 feet.

All similarities between Prudhoe and West Sak end with the oil in place. Estimates are we will get about 50 percent of the oil out of Prudhoe, and we will be lucky if we get 15 or 20 percent——

Senator **Murkowski**. Well, why do you not explain for the record why the estimates of recovery are rather small from the West Sak? What is so unusual about the soil?

Mr. **Patterson**. Okay. West Sak is an extremely fine-grained, unconsolidated sandstone formation, with heavy oil in it.

Senator **Murkowski**. The oil does not sit in a pool, like it does at Prudhoe Bay, then? It is mixed in with the sand?

Mr. **Patterson**. Yes.

Senator **Murkowski**. So how do you get it out?

Mr. **Patterson**. Everything we have tried to put in the well to hold the sand in—the sand comes out with the oil when you produce it. Everything we have tried to put in the well to hold the sand in also holds the oil in because the oil is thick.

It is the consistency of molasses in the reservoir. That is because the reservoir is shallow and closer to the permafrost, and it is colder. In fact, if you can envision trying to pour honey through beach sand in commercial quantities, that is kind of analogous——

Senator **Murkowski**. Honey through beach sand.

Mr. **Patterson** [continuing]. To what you might see at West Sak.

Senator **Murkowski**. Have you developed a technology of recovery?

Mr. **Patterson**. We think we can produce oil wells at West Sak on the order of 300 to 500 barrels per day per well. Now, that compares with the Prudhoe Bay well of 5,000 to 10,000 barrels per day.

Senator **Murkowski**. Well, if you throw enough money at the problem, heat the area or something, can you increase your recovery substantially, or do you run into the economic reality that it costs you more than——

Mr. **Patterson**. That is essentially where we get to, and that is where we are now.

Senator MURKOWSKI. My point is, we are all aware that the reserve is there, but the economics of recovery are faced with the same reality that Conoco experienced, I assume, when you had to shut down your field because you could not make any money.

And the price of oil will determine how much you are going to expend in developing the West Sak concept, I assume. And so it is not something that we can count on.

Mr. PATTERSON. Not at these price levels, no.

I might add one thing. Even if the price of oil were, let us say, $40, which is kind of absurd, but let us just assume that for a moment, to dispel any notions that the potential West Sak may displace Prudhoe decline.

You know, we have produced half the reserves at Prudhoe. Estimates vary, but I think the general consensus is Prudhoe will start declining some time in 1979. That is only a little over—excuse me, 1989.

And it will drop pretty fast because we have spent a lot of money to keep the production rate up. We have added compressors, we have added new processes, we have added water flood, et cetera.

I do not see anything on the horizon, including West Sak at $40 a barrel, that is going to offset that decline. West Sak wells will make 300 to 400 barrels a day each. It will take a lot of wells, if West Sak were to come on and come on at the maximum rate of probably 200,000 to 300,000 barrels a day—not nearly enough to offset the anticipated decline from Prudhoe.

Senator MURKOWSKI. I do not think it is in your testimony collectively, but it would be helpful for the panel to have a consensus from industry on the drawdown on Prudhoe Bay and the lead time necessary on ANWR, so we could determine, OK, here is a pipeline that is producing 20 percent of the domestic oil produced in the United States today.

So it is not an Alaskan issue; it is an issue of national concern. The realization that this is going down, and you are saying that you are not going to get on line in ANWR, if it is opened and if you do find oil, until the year 2000. Where are we going to be, say, in the year 1992 or thereabouts?

So that we can get some idea how significant this potential threat is to not have roughly 2 million barrels a day or 20 percent flowing in that we can count on. And is that anywhere in your collective testimony, a schedule like that?

Mr. HERRERA. Yes, it is actually, Senator. It is in the submission of Standard Oil, certainly a scenario for future production from ANWR.

I think one point that you are making is worth emphasizing, and that is we know exactly what oil we have got in Alaska today. We do not have any discoveries up our sleeve. West Sak is not a discovery that we are likely to bring on stream in the next decade or two.

And so we can predict with a degree of certainty what the decline of existing production is going to be over the next 15 years. We know about the year 2000 we will be lucky if we will be producing 600,000 barrels a day from the state of Alaska, as compared with our present rate of——

Senator MURKOWSKI. You say we will be lucky if you are going to be producing 600,000 barrels a day from the state of Alaska in the year 2000, assuming that nothing happens in ANWR?

Mr. HERRERA. Even if something happens in ANWR, that is not going to come on stream by about until the year 2000. So at that time, that is going to be the situation.

Senator MURKOWSKI. OK. Prior to the year 2000, then, you are looking at about 600,000 barrels a day?

Mr. HERRERA. That is correct.

Senator MURKOWSKI. As opposed to 2 million currently.

Mr. HERRERA. 500,000 to 600,000. There is a little bit of variation.

Senator MURKOWSKI. And that is all of Alaska?

Mr. HERRERA. That is correct.

Senator MURKOWSKI. Except what, the Kenai?

Mr. HERRERA. You are adding the Kenai into that, but that will have an insignificant contribution by that time.

Senator MURKOWSKI. For a period of time up to the year 2000, what we are looking at is 500,000 to 600,000 barrels a day, which is about a quarter of our current production, which means, all things being equal, we would have to import 1.5 million barrels a day from somebody else.

If you would care to provide for the record any additional forecasting, so we can make sure we have that in a concise manner, it would be I think helpful to the Committee.

In the description that was given, I found it quite interesting, the number of wells that you are able to drill from a pad. And this Committee has been exposed to figures that would suggest if all of ANWR is leased, 1.5 million acres, you bought it all, and you developed an infrastructure there with pipelines and drill pads and so forth, that you would actually utilize about 12,000 acres.

Is that accurate, inaccurate?

Mr. HERRERA. Yes, we use that figure, Senator. However, it must be understood that we would actually cover up probably less than half of that amount of tundra, assuming the best case scenario as portrayed by the Department of Interior, three oil fields on production simultaneously on the Coastal Plain.

Those three oil fields would cover up around 5,500 acres of land. We have assumed, though, that the effect of a pad or a road would impact the adjacent acreage, and so you get dust from roads, for example, which will go onto the tundra and perhaps modify that tundra to the extent that animals or birds will still use it, but perhaps use it a little less than before.

So therefore we have conservatively doubled that figure of 5,000 to 6,000 acres to 12,000 acres of habitat which would be impacted, but not put off limits, but impacted by development.

And that development could, you can guess, estimate, might produce anything up to 2 million barrels a day. Your figure is as good as ours.

Senator MURKOWSKI. Now, were any of your companies involved in the Mukluk experiment? Mr. Herrera has a smile on his face.

Mr. HERRERA. Senator, before you ask the question can I make a statement? We perceive that Mukluk was not all bad. Geologically it was a tremendous success story, with the last little detail missing, and that was the oil.

Senator MURKOWSKI. I understand it was one of the more significant holes to throw money into, because you could never quite fill it up. And the industry put roughly a billion dollars in it, and it was supposed to be a sure thing.

Mr. HERRERA. It was perceived to be close to a sure thing. I think MMS gave its chances at 99 percent, which is certain. We ourselves were not that optimistic, but we were very optimistic, as is obvious by the fact that in fact we spent $1.6 billion on that well.

Senator MURKOWSKI. $1.6 billion. That is the most expensive hole in the world.

Mr. HERRERA. Yes. The actual cost of the well was about $135 million, but the acreage which we had to bid on from the Federal Government in order to drill the well increased the total expense, if you will, to $1.6 billion. We have since given that acreage up.

So you are right in suggesting the well cost that amount of money.

Senator MURKOWSKI. You have given up the acreage. It has gone back to the Federal Government and you do not want to have anything to do with it?

Mr. HERRERA. That is correct.

Senator MURKOWSKI. So it proves that oil is where you find it, and that situation could occur in ANWR. Let me ask you this. Do you have in all the public examinations of the geophysical likelihood of finds in ANWR, are they as high as say Mukluk was?

Mr. HERRERA. I believe it is correct to say that there were no public figures issued for Mukluk, with the exception of the MMS figures I just mentioned, which was certain. The public figures and also the industry perception of the prospective of ANWR is very high indeed. It is unusual in that regard, yes.

Senator MURKOWSKI. Would you say it is as high as the prospects were for the Mukluk well?

Mr. HERRERA. I would say it is much higher, for obvious reasons.

Senator MURKOWSKI. When you get to 99 percent, then you are pretty close to Ivory Snow, which is 99 and 99/100ths.

Mr. HERRERA. Oh, I beg your pardon. The pre-Mukluk figures, no. I think you could put them on a par together. The perception of Mukluk is about equal to the perception of the potential of the Coastal Plain.

Senator MURKOWSKI. Mr. Weeks, you indicated something about a lot of gravel remaining at Prudhoe Bay from pits and so forth that is still available. Can you economically move gravel 70 miles or so from Prudhoe Bay to ANWR if ANWR were opened, referring that you would bring gravel from Prudhoe Bay?

Mr. WEEKS. Senator, that is obviously an alternative. My knee jerk reaction is that would probably not be economically attractive as some alternatives for developing gravel sources in the ANWR, close to the activity.

Senator MURKOWSKI. Well, I guess what I am getting at is, you know, if the restrictions were put in saying we do not want you to take gravel from ANWR because of our concern over the impact, is Prudhoe Bay a viable alternative? Or are you prepared to say?

Mr. WEEKS. Well, technically it is viable. What that would do is result in the need to have a bigger accumulation of oil at ANWR to justify development, just because you are going to be confronted with that larger expense on the front end.

Senator MURKOWSKI. I want to go back and reflect on one point that was made earlier, and that is the decline of production and what we are looking at prior to the year 2000. And you are saying 500,000 to 600,000 barrels a day. It would be very helpful if we had year by year—and I know the state of Alaska is very interested in your projections as we get beyond 1989, where we see Prudhoe Bay declining, the realization that Milne Point is down.

We do not know definitely what you are going to do with Endicott, although I understand that that decision either has been made or may be coming on line. So this Committee can kind of reflect on just where the pinch is going to occur and whether the timing of ANWR is mandatory now or still some time off in the future.

Any comment on that?

Mr. WEEKS. We do not have that information. We would be certainly glad to submit it.

Senator MURKOWSKI. Well, you are experts at guessing.

Mr. WEEKS. I agree with Mr. Herrera.

Senator MURKOWSKI. So you can guess in writing.

A little more comment on water. The environmental panel expressed a great concern that there is only one reservoir in the ANWR that does not freeze to the bottom. I believe that is generally correct. And that water was going to be a real problem if ANWR was opened.

Anybody?

Mr. HERRERA. Senator, they were referring to the Sadlerochit Springs, which is a warm water springs at the base of the Sadlerochit Mountains that flows year-round northwards into the Beaufort Sea. That area has been for a long time off limits to even landing a helicopter, for example, because of the special wildlife and plants which are attracted to the year-round source of water, which obviously is somewhat unusual in the Arctic.

Industry would not utilize that at all, for two reasons. One, we would not be allowed to; and two, it would be foolish to do so because it would—it could have the potential of adversely impacting a sort of fairly unique situation, environment.

Certainly water is a problem, as it is all around the North Slope, to the extent we are operating in a desert. But in practical terms, it is no problem at all. And I think the suggestion has been overemphasized and distorted. The reality is, certainly in the exploration phase—and we have heard Mr. Weeks describe what one would do in a production phase.

One would construct very large water reservoirs, which would be beneficial for wildlife and serve a double purpose, both supply of water and environmental enhancement, if you will.

In the exploration phase, when you cannot do that, there are many ways of getting water.

Senator MURKOWSKI. Tell us a couple of the more economical ones.

Mr. HERRERA. The simple one is if you do not have a lake—and there are not too many lakes in the 1002 area compared with further to the west of Prudhoe. If you do not have a lake which does not freeze to the bottom or no lake at all, let us say, you cannot—you are not allowed by the Department of Fish and Game to take any water out of rivers because the rivers have very few deep holes, which are inevitably overwintering habitats for fish, and therefore you do not disturb those. You do not take water out.

This is a given. It is well understood. It has been practiced for years on the North Slope, and it is the sort of rules that we routinely cope with.

The first thing you would consider doing is putting up snow fences and simply, in that simple, cheap way, collecting oodles of snow. And you will do—although the snowfall is not high in the North Slope, there is a constant wind, and so what little snow there is blows around.

Senator MURKOWSKI. Is it not going to blow off your snow fence and go onto somebody else's?

Mr. HERRERA. No. As soon as you put a barrier in front of that snow, it collects up more than you can deal with.

Senator MURKOWSKI. Have you done this?

Mr. HERRERA. We have done this.

Senator MURKOWSKI. And you can recover economically?

Mr. HERRERA. Yes, sir, that is right. We have drilled exploratory wells in the North Slope utilizing melted snow collected with snow fences. So it has been done before. It can undoubtedly be done again.

If you cannot, if for some reason you do not want to do that, and you are not close to the coast, so you cannot distill seawater, desalinate seawater, which is obviously another viable option that has been done many times before—the plants are in existence to do that in the Arctic. If you cannot do that, then you have the option of bringing water in.

We bring fuel in. Carrying liquids is expensive and inconvenient, but you can do it and it has been done.

Senator MURKOWSKI. You could truck it from Prudhoe Bay, then?

Mr. HERRERA. If you wanted to, in the wintertime you certainly could.

Another option, as was mentioned earlier, is the simple option that you use if you are drilling in the middle of the Sahara Desert. You have to have water for a well. When you are in the middle of that desert, you obviously have no water.

We do not have much more on the Coastal Plain. You simply drill a shallow hole down to water-bearing formation, take that out, and that is the water you use for your major drilling efforts.

Senator MURKOWSKI. There is no water table naturally under the area, that you can just drill a well, like I can in my back yard in Fairbanks, and hit water.

Mr. HERRERA. Yes, there is. You have to drill beneath the permafrost. Once you go through that permafrost, you are in all sorts of water. Usually it is salt water or salty, sea water in essence trapped in sediment.

Senator MURKOWSKI. How deep do you have to go?

Mr. HERRERA. 2,000 feet.

Senator MURKOWSKI. 2,000 feet?

Mr. HERRERA. Yes.

Senator MURKOWSKI. To find water.

We have heard a lot of discussion, appropriately so, on the issues of air quality, and I think you have responded to those relatively thoroughly this morning. The hazardous waste matter was generalized by the environmental panel, other than the references specifically to the pictures that were put in evidence.

And I assume that the reference on page 15 yesterday of the statement from the environmental community from July—well, I should identify it further. This is from Dr. Hair of the National Wildlife Federation, indicating from July of 1982 to April of 1983 oil companies and others delivered their wastes to an illegal dump. The dump was cleaned up only after the Alaska Department of Environmental Conservation doggedly pursued the issue. By the time the cleanup ended in mid-1983, 58,000 gallons of liquid wastes, 1,600 cubic yards of contaminated solid wastes, and 14,000 drums had been removed.

Mr. WEEKS. Senator, if I may.

Senator MURKOWSKI. Yes.

Mr. WEEKS. I am not sure, but I think that Dr. Hair is referring to the North Slope Salvage drum recycling operation that I showed you the photographs of and described earlier. And the only connection I can make there is that there was about 15,000 drums involved in that activity.

Now, that was not illegal. That was permitted by the various state agencies. North Slope Salvage essentially went away and left the operators holding the bag on that, which we did go in, as the photograph evidenced, and cleaned up the mess.

Senator MURKOWSKI. Do you know of any other hazardous waste dumps? Do you know any reference to the generalization that there is a Superfund waiting to happen?

Mr. WEEKS. No, sir. Obviously there are legally hazardous wastes generated, and I use the distinction "legally" because of the RCRA definitions of what is hazardous and what is not. Crankcase oil, for instance, is a legally hazardous waste, although it is not toxic or anything like that.

All that material that is generated in the oil field is properly manifested, documented, and disposed of down a legally permitted RCRA well that we operate in the Prudhoe Bay area and Kuparuk. And I know of no illegal dumps in operation on the North Slope.

Senator MURKOWSKI. Well, let me ask you this. Are there accidental or unpermitted discharges of reserve pit fluids? You know, you have got waste material. Do you burn it, do you dump it? Is it put in permitted dumps?

Mr. WEEKS. The standard practice for reserve pit fluid management is to put nothing in there except drilling muds and solids. The fluids resulting from the drilling operation are injected in the annulus of one of the wells that is being drilled on the pad, and this is with the appropriate DEC and resource group permits.

Senator MURKOWSKI. Has there been mitigation of the fluids, the heavy metals or whatever that remains from the pits?

Mr. WEEKS. Earlier drilling mud systems at Prudhoe did contain some amounts of heavy metals, principally chromium. Those mud systems have since, long since, been discontinued. There are trace levels of chromium present in the reserve pits.

Now, when the snow fills the reserve pits and melts, of course, it picks up some of these trace levels of chromium. We sample that water, test it, and it has to meet state water drinking quality standards before it is discharged to the tundra.

If it does not meet those standards and the pit has to be pumped—the reason we pump the pits is so they do not overtop and have an uncontrolled discharge to the tundra. We pump the pit and that material goes down our permitted well.

Senator **Murkowski**. Well, in view of the Chairman's temporary absence, I would like to ask that, since we do have a check and balance here in the sense of the various interest groups that have testified, that the specific criticism as evidenced in the public record by the environmental panel that made certain general assertions be addressed in the record by your panel specifically, so that when we review the record we can determine whether we in fairness feel that you have attempted to answer the generalizations and the assertions made concerning hazardous wastes, water, and air.

My last question is that we heard allegations of large amounts of oil spills at Prudhoe Bay over the period of time. And I do not recall the figure that was used by the environmental panel, but we could dig it out if you do not.

Mr. **Herrera**. In that environment—and you have to remember that most of the year it is very cold and difficult to operate there physically—it is inevitable that oil spills will occur. Your hydraulic tubes on a piece of equipment are going to break even if you change them every day. They will still break at 60 below. Hydraulic fluid goes on the ground.

There have been in the last few years approximately 500 to 550 spills which are reported to DEC on more or less an annual basis, about that number. Any spill, irrespective of how small, has to be reported, and that action triggers off a necessity to clean it up, describe the spill, clean it up.

Senator **Murkowski**. Is it easier to clean it up up there than it is, say, in my colleague's state of Louisiana?

Mr. **Herrera**. Yes. The point about spills in the Arctic is, of course, in the cold it is very easy.

Senator **Murkowski**. The oil congeals and you can shovel it up.

Mr. **Herrera**. Of course, you can physically shovel it up.

And the other point, of course, is that most of these spills, the vast majority of them, occur on gravel, on your gravel work pads or your roads where you are operating. It is only a very small minority which occur on the tundra for some reason.

And those are treated the same way as on the gravel. They are immediately reported and they are cleaned up. So one can go to the records and see the after-effects of spills, because it is all reported there.

And although they occur and we are doing all we can to prevent them occurring with a degree of regularity, the effects on the environment are simply not there, because of the cleanup efforts and the rehabilitation efforts of any damage that is done to the tundra on the few occasions when spills do reach the tundra.

Senator **Murkowski**. Well, as you have observed, the Committee is very, very concerned about the environmental consequences.

And I would suggest, as you have attempted to address those areas, that you also reflect on those general criticisms.

I would like to ask, Dr. Maki—is that the correct pronunciation?

Dr. **Maki**. "Mackey," yes, sir.

Senator **Murkowski**. How many caribou cross the Dempster Highway? And do they cross coming and going each year? And do they come over without calves and go back with calves?

Dr. **Maki**. Yes, as you are aware, the Dempster is in the Yukon and it represents a highway crossing part of their range. They will cross it. A fair number of the herd winter to the east.

Senator **Murkowski**. Does the porcupine herd have to cross it to get to the other side, or is there another way to get to the other side?

Dr. **Maki**. To get to that portion of the range, they do indeed have to cross the highway.

Senator **Murkowski**. If they are coming to where they come, as we generally concur, which is eventually they are trying to get to Alaska to spend the summer, they have to cross the highway.

Dr. **Maki**. That is indeed—there are some animals, I will point out, that do overwinter to the west of the highway.

Senator **Murkowski**. They stay over there all the time.

Dr. **Maki**. Yes. The herd distributes in that upper Porcupine Valley over a wide area.

Senator **Murkowski**. How much traffic is there? Tell us about the Dempster Highway? Is it just, is it a highway? Is it paved, is it gravel? Are there trucks over it? Does anybody go over it?

Dr. **Maki**. It is a gravel road in that area, and frequency of traffic, as you might expect in the northern Yukon, is relatively light.

Senator **Murkowski**. Is it closed during the migration period?

Dr. **Maki**. I am not sure.

Senator **Murkowski**. Does anybody know that for a fact?

Mr. **Herrera**. No, it is not, Senator. The highway, of course, is the main influx to the Northwest Territories area up on the Beaufort Sea coast, Anuvik. And Anuvik is a town of——

Senator **Murkowski**. I have been to Anuvik.

Mr. **Herrera**. Well, you know it. It is not that big, but nevertheless this is its only access. The highway is open year round. Caribou go across that road twice a year.

Senator **Murkowski**. Trucks go up to Anuvik, deliver groceries and mail?

Mr. **Herrera**. Correct, everything.

Senator **Murkowski**. And why does not the Canadian Government close the highway during the migration?

Mr. **Herrera**. The Canadian Government does not see fit, for probably its own practical reasons, Senator, in the same way that it did not see fit to confine exploration drilling in the area of the porcupine caribou herd range on the Canadian side of the border.

Senator **Murkowski**. Now, tell me a little bit about that? You are saying the Canadians have drilled on their side of the border in the range of the porcupine caribou herd?

Mr. **Herrera**. Yes. Most of the area on the Canadian side of the border has been leased over the past 20 years to the oil industry, and dozens, probably on the order of over 60 wells, exploratory wells, have been drilled within the area used by the caribou.

Senator **Murkowski**. Now, is that calving, too?

Mr. **Herrera**. Including wells in the calving area up near the coast, near the Babbage River, that is correct.

Senator **Murkowski**. And what effect has this had on the caribou?

Mr. **Herrera**. Well, no effect that anybody can recognize, and certainly no effect admitted by the Canadian Government.

Senator **Murkowski**. Did it have a displacement or a higher fatality rate in the calving? Or do you know?

Dr. **Maki**. The best barometer, again, is the growth of the herd, and the annual statistics indicate that they reproduce 18, 19 percent per annum, very good, healthy reproductive rate.

Senator **Murkowski**. So they may have been displaced by some of the activity.

Dr. **Maki**. Again, a subtle displacement probably has occurred on site by site locations. But the best barometer, again, is the growth of the herd, which indicates no significant impact from a demographic standpoint.

Senator **Murkowski**. Now, you say they drilled 60 wells in this portion on the Canadian side where the porcupine pass through. And how large an area would the 60 wells encompass in relationship to the 1.5 million acres of ANWR?

Mr. **Herrera**. A much larger area than that, many millions of acres, compared with the Coastal Plain. But their drilling was not confined just to the range. It was also confined to the Coastal Plain area of the Northern Yukon National Park, for example, which is a similar habitat to our 1002 area on our side of the border.

So there have been exploratory wells drilled in acreage with similar values to our 1002 acreage in Canada.

Senator **Murkowski**. And the results of that drilling?

Mr. **Herrera**. The results of that drilling apparently have been unsuccesful.

Senator **Murkowski**. Did they make it a park after the exploration and drilling?

Mr. **Herrera**. Yes, although there are still valid leases within the Northern Yukon National Park on the Canadian side.

Senator **Murkowski**. Dr. Maki, is it generally conceded that this year the herd calved in Canada?

Dr. **Maki**. We are just seeing that data now. As you are probably aware, the historical peak is around the first week of June for calving on the North Slope. So we are still seeing calves being born here now. But the first verbal reports of distribution now that we are seeing indicate that the majority——

Senator **Murkowski**. Well, I have been hearing all kinds of rumors now. Can you deny them or confirm them? I was told that the calving occurred this year "in Canada."

Dr. **Maki**. Yes, that I think is a valid statement.

Senator **Murkowski**. That is true?

Dr. **Maki**. That is a valid statement. They distributed again over a wide range, but the balance indeed occurred across the border.

Senator **Murkowski**. Is this because, in your opinion, that the winter was perhaps a little harsher this year?

Dr. **Maki**. We had a very curious distribution of weather up there in the past two weeks. It has been a period of very cold, wind-swept, late breakup in that area, which may have indeed again brought about a weather-mediated effect in the distribution of the calving.

Senator MURKOWSKI. I was told that this is the second year out of seven that they have calved in effect in Canada—excuse me. There have been two years out of seven where they calved in Canada. This would make the third year out of eight?

Dr. MAKI. Indeed, indeed. Last year we saw similar behavior. We saw a preponderance of calving across the border.

Senator MURKOWSKI. What does this do to the theory that there is a core calving area somewhere around the Jago River?

Dr. MAKI. Again, we are trying to demonstrate that, from an actual data standpoint, when you look at the distribution of calving, it is represented by a wide range, and that fidelity to a specific concentrated calving area is really not a significant concept.

Senator MURKOWSKI. Should a non-scientific explanation be that they have a gestation period of whatever it is, and wherever they are at that time is where they calf?

Dr. MAKI. Well, there is certainly something to be said for that viewpoint.

Senator MURKOWSKI. Well, if you could give me something a little more definitive than "something."

Mr. MAKI. We think that——

Senator MURKOWSKI. You know, I am sure that occasionally a child will be born in a taxicab or an airplane, and it is not by design.

Dr. MAKI. Indeed.

Senator MURKOWSKI. I am not suggesting that there is any similarity, but there is a gestation period that is recognized. And I want to know your professional opinion.

Dr. MAKI. Well, again, over the eons——

Senator MURKOWSKI. Do they hold off until they get to where they want to go or do they just calf when the period is up?

Dr. MAKI. When it is time it is time. But certainly their internal biological clocks are working very effectively, and they are aware that calving is going to occur in the spring and that it is time to move away from predator areas, where that newborn calf is likely to be subject to——

Senator MURKOWSKI. So your explanation is that they move out to that Coastal Plain from the standpoint of the best possible case, because there are no predators for the calves out there, or fewer predators, and while there may be a more convenient place to calf in that they would not have to walk so far, they are out there for a specific reason?

Dr. MAKI. Again, that combination of distance from historical wolf denning areas, looking for windswept brown ground away from snow areas, seems to be very subjective pieces that all fit to make a description of caribou calving attributes.

Senator MURKOWSKI. Tell us a little bit about the predators? Are we talking primarily about the wolf and I assume the bear, brown or grizzly?

Dr. MAKI. And to a limited extent the rapturs, the golden eagles to a limited extent.

Senator **MURKOWSKI**. Now, do the predators need cover, wolves particularly? The wolves do not go out and forage on the open Coastal Plain where there is no cover?

Dr. **MAKI**. It looks from, again, the historical data—and we have to consider what is also happening to their life cycle at that time. They are denning. Their pups are also being born. Therefore, they have a limited range that the hunting pack can travel.

And when you look at the circumpolar information data from Canada, Alaska, and Siberia, data seem to indicate that there is a distinct recognition of a distance, perhaps 40 to 60 kilometers, that the calving caribou have to be away from tree line or hilly areas, traditionally represented as wolf denning habitats.

Senator **MURKOWSKI**. The point was made yesterday that the survival rate of calves is much higher if they calf on the Coastal Plain than if they calf someplace else. Is that because there are more predators someplace else?

Dr. **MAKI**. I heard that statement made yesterday and, sir, I am unaware of any data that support that.

Senator **MURKOWSKI**. You do not necessarily find that there is any scientific evidence to support the contention that calves' rate of survival is much lower unless they reach the Coastal Plain?

Dr. **MAKI**. We have made a fairly comprehensive search of the literature to try to find information to that effect, is it indeed significant, and so far we have been unable to find it.

Senator **MURKOWSKI**. I would like the record to indicate that it would be appropriate to check to see if there is a source of information that the environmental panel submitted.

Mr. **HERRERA**. Senator, yesterday it was said that that information was given to Mr. Mark Fraeker of Standard Oil Company, and I asked Mr. Fraeker exactly what he was given and what it showed. I think Mr. Rogers made a mistake in that regard, because the data was not given to Mr. Fraeker pertinent to this.

But as a result of inquiries he made, the situation seems to be as follows. The data, as Mr. Rogers said yesterday, was from the years 1982, 1983, and 1984. There are data available from 1985, but that has not been published and I presume it was not used.

What happened was, in 1982 an attempt was made to put radio collars on young calves in Canada, to ascertain the fate of those calves and whether they were predated on and whether they survived, and so on and so forth. It was the first year of this experiment and apparently the scientists had lots of real problems putting the radio collars on these calves without leaving the calves in a condition which made them acceptable to their mothers.

A human scent on the calves apparently made many of them subsequently—caused many of them subsequently to be rejected by their mothers. And consequently, the fact that in that year, the first year of this experiment, a disproportionate number of these calves died, it might well be a result of the shortcomings of the experiment.

In subsequent years, in 1983 and 1984, the same experiment was repeated in the so-called core or concentrated calving areas in Alaska. By this time, the faults, which were clearly recognized in the 1982 exercise, were ameliorated, if you will, and the calving—or the collar fitting on the calves was much more successful.

Consequently, as you would expect, more of those calves survived. And it is using this skewed and unusable data that gives rise to the suggestion that calf survivability in Alaska is higher than in Canada.

It was not a valid experiment. It has never been published. It has never been subjected to peer pressure. And from the description we were given of it last night, it never will.

Senator MURKOWSKI. Well, it would seem to me there would be some validity for the contention that if the cows gave birth in the area of the foothills where the predators concentrated, there would be more likely evidence that more calves would be taken by predators in that area than if the calving occurred on the Coastal Plain where there are no predators.

Is that not a reasonable assumption?

Dr. MAKI. Yes, that is a reasonable assumption. But again, there is ample Coastal Plain habitat available to ensure that that predator-prey distance does occur.

Senator MURKOWSKI. My impression is they have to get there first, and to get there they have got to come through the foothill area where there are predators. And if they drop their calves then, why, the calves are more subjected to—but this is your hearing, not mine.

Dr. MAKI. Indeed, that is correct.

Senator MURKOWSKI. Mr. Cook, for the record, what did it cost to drill the Kaktovik well?

Mr. COOK. Approximately $50 million, Senator.

Senator MURKOWSKI. Where did you get the fresh water to drill it?

Mr. COOK. From a lake very nearby.

Senator MURKOWSKI. A lake. Does it freeze to the bottom?

Mr. COOK. No, sir. This lake was some 15 or 16 feet deep, and it was a good source of water. It did not draw down at all.

Senator MURKOWSKI. All right. Did you have a permit from somebody to get the water?

Mr. COOK. Yes, sir, both from the North Slope Borough and from the division of lands and water. And the operation there, the extraction of the water, was also reviewed and approved by the U.S. Fish and Wildlife Service.

Senator MURKOWSKI. So you just did not go in and tap a lake?

Mr. COOK. No, sir.

Senator MURKOWSKI. The lake is back up to its level. And how much water did you need to drill a well like that?

Mr. COOK. Well, I have got some exact figures, Senator. It would take me a minute to dig them out.

Senator MURKOWSKI. Well, let us put them in the record.

My question is, is that lake sufficient to allow you to drill the field if it were open?

[Subsequent to the hearing, Mr. Cook submitted the following:]

Chevron
Chevron U.S.A. Inc.
P.O. Box 107839, Anchorage, AK 99510 • Phone (907) 563 2560

June 26, 1987

June 12, 1987 Hearing On
ANWR Coastal Plain

The Honorable J. Bennett Johnston
United State Senate
Chairman, Senate Energy Committee
136 Hart Senate Office Building
Washington, D. C. 20510

Dear Senator Johnston:

During the hearing before your Committee on June 12, 1987, I was asked by Senator Murkowski to provide information on the amount of fresh water used in the drilling of the KIC No. 1 exploratory well and a description of how fresh water for the operation was obtained.

Fresh water for the KIC No. 1 operation was obtained from a lake located 3.5 miles west of the drillsite and from accumulated snow which was used to construct an airstrip and ice roads. Attachment 1 shows the location of the KIC No. 1 drillsite in relation to Prudhoe Bay and Kaktovik. Attachment 2 is a more detailed map showing the locations of the lake used as a freshwater source, the ice airstrip which was used during the first year of operations (winter of 1984-85), and the drillsite.

The fresh water for domestic use at the drilling camp and the drilling operation was obtained from the lake. Consumption for these purposes averaged about 100,000 gallons per month. Drilling operations were conducted from mid-February 1985 until early May 1985 when operations were suspended. The second year of drilling began in late November of 1985 and the operation was completed in late April of 1986. Approximately eight months were required to drill the well. During this time, an estimated 800,000 gallons of water were withdrawn from the lake for camp use and drilling operations. To put this figure in perspective, consumption of 100,000 gallons per month is equivalent to the average monthly consumption of seven Anchorage households.

Fresh water was also used for partial construction of an ice road to connect the drillsite with the lake and the airstrip. Although the lake was 3.5 miles from the drillsite, only 1.5 miles that was on the tundra required the use of fresh water. Two miles of the road to the lake were on sea ice and therefore did not require fresh water. The portion of the ice road on the tundra required about 2,300,000 gallons of water. An estimated 80 percent of the required water was in the form of collected snow. About 460,000 gallons of water from the lake was used to construct and maintain the road to the lake. This temporary road was constructed twice (at the start of each drilling season), therefore total usage for this purpose is estimated to be 4,600,000 gallons of which about 920,000 gallons were obtained from the lake.

The remaining requirement for fresh water involved the construction of an ice airstrip on the tundra during the first year of operation. The airstrip was 5,000 feet long, 150 feet wide, and 1 foot in thickness and was located on the tundra to provide a safe airstrip for the Hercules C-130 aircraft which were used to fly the rig, camp, and pad materials to the drillsite. The total fresh water requirement for the airstrip was 10,600,000 gallons. As with the ice road, about 80 percent of the water was in the form of collected snow. An estimated 2,120,000 gallons were obtained from the lake for construction and maintenance of the airstrip during the first year of operations.

The operation was also supported by aircraft during the second year of operations. However, during our first year of operations, we learned that the adjacent sea ice would be suitable for the airstrip. Therefore, the airstrip for the second season was placed on sea ice which further reduced the requirement for fresh water.

Total fresh water usage was 16,000,000 gallons of which 3,840,000 gallons were taken from the lake. The largest source of fresh water was collected snow equivalent to 12,160,000 gallons of fresh water. The primary means of collecting wind-driven snow was through the use of snow fences which were placed to collect snow where it was needed.

The fresh water usage from the lake was under approvals issued by the Department of Natural Resources (State of Alaska) and the North Slope Borough. Before these approvals were granted, Chevron had biologists survey the lake for fish species. Approvals were granted after it was determined that the lake did not support a significant fish resource. The freshwater lake did not show any signs of draw-down as the water level would rise back to normal levels after a period of heavy water withdrawal. Apparently, the lake was recharged from a groundwater source.

I should also mention that we had contingency plans for other water sources to support the operation if the lake had proved inadequate or its use was not approved. The desalinization of sea water and/or the collection and melting of snow could have provided feasible alternative sources of fresh water.

Attachment 3 to this letter is a copy of a statement on the KIC No. 1 operation which I presented to the Alaska State Senate Resources Committee on April 13, 1987. This statement includes a general description of the KIC No. 1 operation which may prove useful to the Committee.

Please contact me if I may provide the Committee with additional information as you consider the important question of allowing oil and gas exploration, development, and production on the ANWR Coastal Plain.

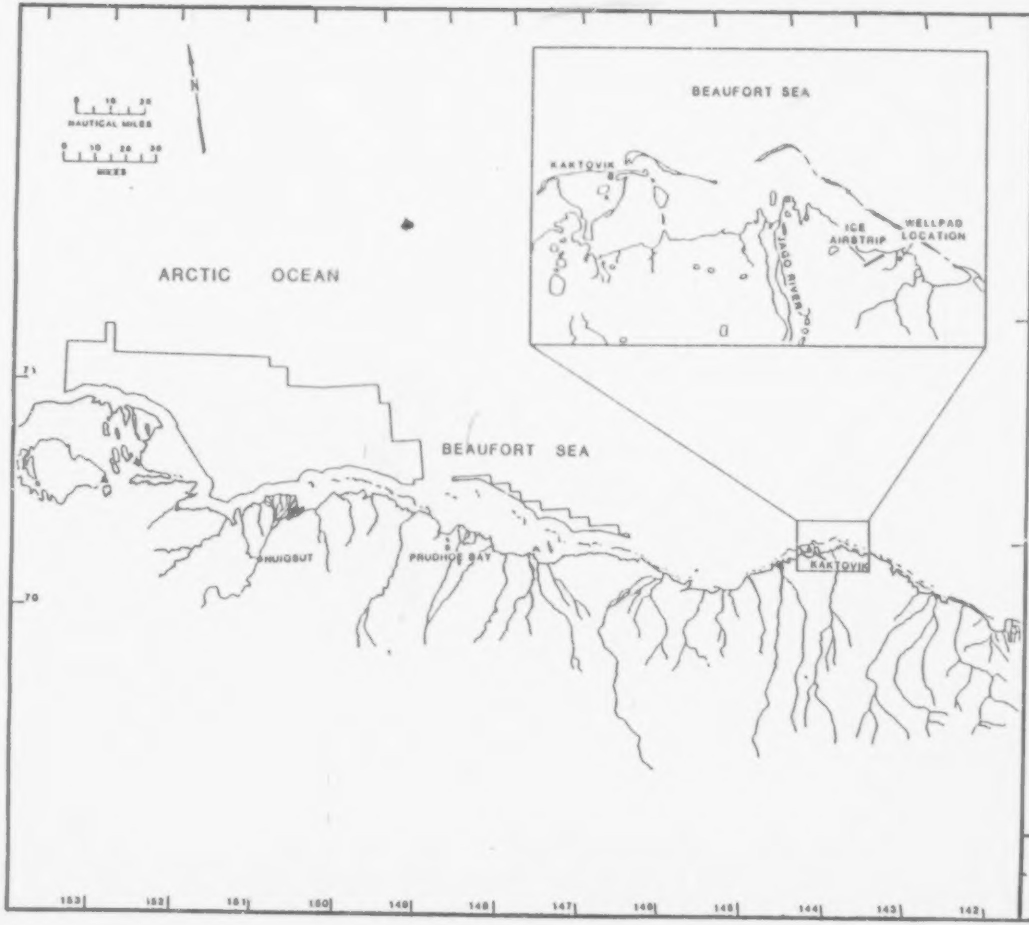
Sincerely,

Thomas Cook

Thomas Cook
Exploration Representative-Alaska

TC:mw
Attachments

cc: Senator Frank Murkowski (w/attachments)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ICE AIRSTRIP
WELLPAD LOCATION
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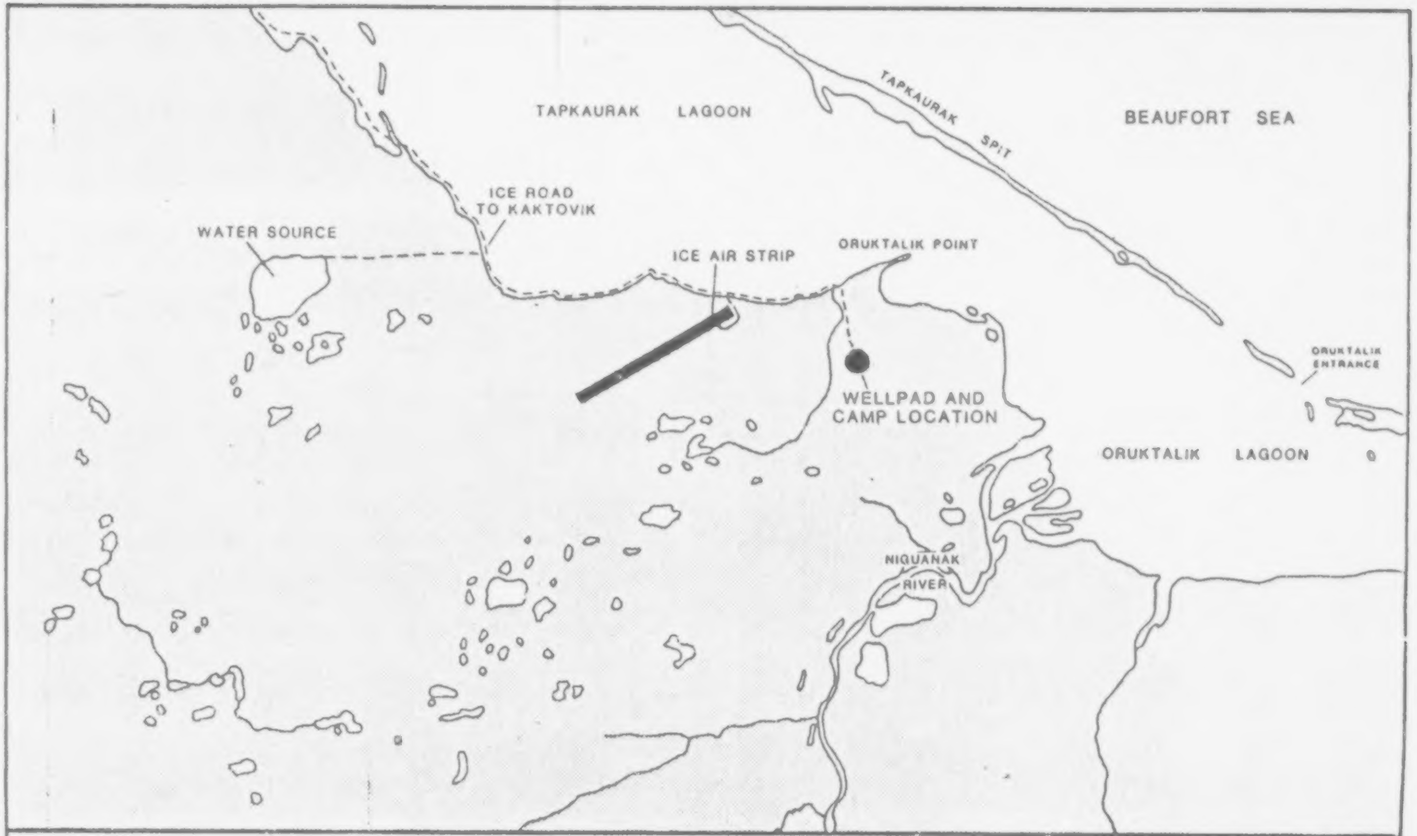
LOCATION OF KIC
EXPLORATORY WELL IN
THE BEAUFORT SEA
COASTAL AREA

Attachment 1

Attachment 2


TAPKAURAK LAGOON
TAPKAURAK SPIT
BEAUFORT SEA
ICE ROAD TO KAKTOVIK
WATER SOURCE
ICE AIR STRIP
ORUKTALIK POINT
ORUKTALIK ENTRANCE
WELLPAD AND CAMP LOCATION
ORUKTALIK LAGOON
NIGUANAK RIVER

KIC EXPLORATORY WELL SITE

Scale:
1 inch = 4,086 feet
1 inch = 0.77 miles

Chevron

Attachment 3

STATEMENT OF THOMAS COOK, CHEVRON U.S.A. INC.

BEFORE

THE ALASKA SENATE RESOURCES COMMITTEE

HEARING ON THE QUESTION OF ALLOWING OIL AND GAS EXPLORATION, DEVELOPMENT, AND PRODUCTION ON THE COASTAL PLAIN OF THE ARCTIC NATIONAL WILDLIFE REFUGE

KODIAK, ALASKA

APRIL 13, 1987

Good morning Mr. Chairman and members of the Committee. My name is Thomas Cook and I am employed by Chevron U.S.A. Inc. as Exploration Representative for Alaska. For the record, Chevron's business address is 3001 'C' Street, Anchorage, Alaska, and our mailing address is P.O. Box 107839, Anchorage, Alaska 99510.

Chevron appreciates this opportunity to appear before the Committee in response to your invitation of April 1, 1987. We have followed with interest the Committee's previous hearings on this important subject, which were held in Fairbanks, Anchorage, and Ketchikan last month.

In the course of these hearings, you have received a wide range of testimony on various issues related to the question of opening the coastal plain of the Arctic National Wildlife Refuge (ANWR) to oil and gas exploration, development, and production. We believe that a thorough evaluation of the testimony presented at these hearings will lead to the conclusion that the opening of the coastal plain to competitive oil and gas leasing is a matter of utmost importance to Alaska and the nation.

Chevron fully supports and endorses the testimony previously presented to the Committee by the Alaska Oil and Gas Association. Chevron strongly urges the Alaska State Legislature to adopt and submit to the Congress a resolution which expresses unequivocal support for opening the coastal plain of ANWR to oil and gas exploration, development, and production. In our view, it is imperative that the Alaska Legislature be fully supportive of the proposition that it is in broad public interest to allow for exploration, development, and production on the coastal plain of ANWR.

We recognize that there are many aspects of this issue which are of concern to the Committee. However, the central task is to convince the Congress of the broad public interest to be served by opening the coastal plain to full leasing. Unless this important goal can be accomplished, we will never know if the coastal plain holds the petroleum reserves which could be so important to Alaska and the nation.

In your invitation to appear before the Committee you expressed specific interest in the KIC #1 well, an exploratory well drilled by Chevron about 14 miles east-southeast of the village of Kaktovik on Barter Island. The KIC #1 well was drilled on native-owned lands in the ANWR adjacent to the area described in Section 1002 of ANILCA as the coastal plain. The Kaktovik Inupiat Corporation (KIC) owns the surface of the lands and the Arctic Slope Regional Corporation (ASRC) is the owner of the subsurface. The native-owned estate is about 92,000 acres.

Chevron and its partners, Standard and BPAE, have an exploration agreement and oil and gas leases with ASRC/KIC on their lands in the ANWR. I want to point out that the Chevron/BPAE/Standard agreement with ASRC/KIC came about as a result of competitive bidding which was open to interested parties and involved many companies. Although we do not discuss the provisions of our business agreements for competitive reasons, our agreement with ASRC/KIC is typical in that the landowners will retain a substantial portion of any revenues derived from production which may be developed from their lands.

Although the results of this exploratory well are held in strict confidential status for understandable reasons, there are some facts about the drilling operation which may be of interest to the Committee.

The drilling of the KIC #1 demonstrates that such operations can be conducted with minimal impact on the environment and wildlife. Mobilization to the drillsite began in December 1984. Equipment was moved across the shorefast ice to the location and a temporary airstrip was constructed of snow and ice. Materials for the pad construction were then flown in by Hercules C-130 aircraft. A temporary pad was constructed using two layers of high density styrofoam, overlain with two layers of heavy timbers. With the temporary pad in place, camp facilities to accommodate approximately 70 workers and the drilling rig were flown in and placed on the pad. Ice and snow roads were constructed to connect the drilling pad with the airstrip and the nearby lake used as a water supply. The entire operation was supported by air and Rolligon across the sea-ice and ice roads from Deadhorse. Drilling commenced on February 18, 1985 and continued until May 6, 1985, when drilling was suspended to avoid any disturbance to caribou and other wildlife that may have been in the area.

In the late fall of 1985, after freeze-up and with snow cover to protect the tundra, crews re-established a new airstrip — this time on sea ice. New ice and snow roads were built to connect the drillsite with the nearby lake used as a water supply and with the airstrip. The drilling rig and camp were re-mobilized and drilling resumed on November 24, 1985. Drilling operations continued until April 19, 1986 and the well was officially plugged and abandoned on April 24, 1986, after reaching a total drilled depth of 15,193 feet.

The drilling rig and camp were dismantled and removed from the drillsite during late April and the first part of May using Hercules aircraft and the Rolligons. Time and scheduling are absolutely critical factors in any arctic seasonal drilling operation and it was important to get the rig and camp off location and back to Deadhorse before break-up. Otherwise, we would have incurred additional stand-by costs for the rig and camp until the following winter.

During the summer of 1986, crews dismantled the drillpad. Timbers and the styrofoam insulation were stacked and banded for removal this past winter when freeze-up and snow cover provided the opportunity for travel across the sea ice and access to the drillsite without damage to the tundra. This summer crews will return to the location for final clean-up and rehabilitation of the drillsite. When our work is complete, there will be little evidence of the operation except for the marker post installed at the location of the hole, which is required by state law.

Although the KIC #1 was drilled on privately owned land, the terms and conditions of the conveyance to ASRC stipulated that operations would be subject to the authority of the U.S. Fish and Wildlife Service. A detailed Plan of Operations was submitted to the Fish and Wildlife Service and all operations were subject to the approval of that agency. In fact, the Plan of Operations was reviewed and approved by several other state, local and federal agencies. The permit approval process proved more than adequate for the protection of the environment and wildlife. More importantly, the KIC #1 demonstrates that our industry has the technology and skills to operate in the coastal plain without undue impact on the environment.

As with our previous exploratory drilling programs on native lands elsewhere in Alaska, Chevron made employment opportunities available to the local residents. A further benefit to residents of the North Slope was the use of native-owned contracting and construction services.

In closing, I would like to comment briefly on the issue of the confidentiality of exploratory well data, a subject which has been raised at the previous hearings. Data and information from exploratory wells are acquired at significant cost, particularly in Alaska, and are extremely important to a company's competitive position. The KIC #1 represents an expenditure in excess of $40 million. It is standard industry practice, consistent with state law and regulations, to hold data from an exploratory well in strict confidence. Data from such a well are a valuable asset which are used in planning future exploration and may potentially be sold or traded. To make such data public would destroy its value. Release of these data without fair compensation would be contrary to Chevron's interest and an unacceptable business practice.

Thank you for the opportunity to participate in these important hearings.

Mr. Cook. Well, I am not sure that it would hold up for a development phase and support that. But it was certainly more than adequate to support the exploratory operation. And there was no——

Senator Murkowski. That—excuse me. I did not mean to cut you off.

Mr. Cook. I say there was no apparent drawdown of the lake's volume at all. So there must have been a replenishment through a ground water source.

Senator Murkowski. If you went ahead as a consequence of Congressional action to authorize the opening, would your permit stand that you could pull the plug on that lake, or would you have to start the process of permitting all over again?

Mr. Cook. Well, if we drilled additional exploratory wells, Senator, we would have to go through our permitting process again. And that would include water use, temporary water use permits.

Senator Murkowski. So there is a check and balance on the right to go in and utilize water.

Where did you get the gravel?

Mr. Cook. We did not use any gravel, Senator.

Senator Murkowski. You did not use any gravel?

Mr. Cook. We used a temporary pad construction technique that had been used at least twice before. It involved putting down layers of high density styrofoam, two by eight foot sheets. Those were covered by a plastic liner, and then on top of that we put two courses of heavy timbers, three by twelve timbers, which were crisscrossed. The workers out there called it a dance floor.

Senator Murkowski. A dance floor. How big a dance floor was it?

Mr. Cook. About 400 by 450 feet.

Senator Murkowski. 400 by 450.

Mr. Cook. That was adequate for the rig and the support facilities, the camp and so forth.

Senator Murkowski. What was the period of drilling there?

Mr. Cook. We mobilized for that site from December of 1984—and this covered the period of construction—got on location and began drilling the first year mid-February. We suspended operations in early May.

Senator Murkowski. Why?

Mr. Cook. Well, that had been part of our plan of operation. For one thing, we used temporary facilities in terms of the ice roads and the ice air strips, so we had to more or less shut down.

Senator Murkowski. So your planes flew in and landed on the ice on the lake?

Mr. Cook. Yes, sir.

Senator Murkowski. And you had an ice road?

Mr. Cook. An ice road from the pad area to the water supply.

Senator Murkowski. That is why you did not use any gravel?

Mr. Cook. That is right. We were—there was no use of gravel at all. There was some fill material.

Senator Murkowski. Is this a practical engineering technique to use in that area for exploration?

Mr. Cook. Oh, it has got its drawbacks, I think, as other techniques. It is another alternative, and particularly where you want to minimize any permanent impact.

Senator Murkowski. That is what you wanted to do there?

Mr. Cook. That is exactly what the Fish and Wildlife Service wished us to do.

Senator Murkowski. Now, what is there today—how many people were involved in the drilling? You said you went through a season, you stopped in May. Did you stop because the caribou were migrating through? Was that an additional reason?

Mr. Cook. Well, I would like to comment on that.

Senator Murkowski. I do not want to pull these answers out of you.

Mr. Cook. Well, one of the witnesses yesterday asserted that the reason why we suspended operations was that there were some 5,000 caribou in the area. In fact, we had always planned to suspend that operation, for a number of reasons, one of which was to avoid disturbance.

Senator Murkowski. And the lake melts and the road melts.

Mr. Cook. Well, that is right, too, yes, sir.

Senator Murkowski. And then you went back in.

Mr. Cook. Went back in the next winter, remobilized the location. That is, put the mast up, which had been lowered to protect waterfowl, reconstructed the ice roads, built a second airstrip, this time on the sea ice, since we were not landing heavy aircraft, and commenced drilling again, and completed the operation that spring.

Senator Murkowski. How many men were involved?

Mr. Cook. Oh, I guess on average we had probably 60 men and women at the site. The construction period would have involved somewhat more.

Senator Murkowski. Did you take down the rig during this period from May to whenever?

Mr. Cook. We essentially dismantled the rig and lowered the mast.

Senator Murkowski. Well, was it standing up, as a layman would see it, or was it laying down, or was it at less prominence?

Mr. Cook. Well, it was laid down, I guess that is the way to put it.

Senator Murkowski. It was?

Mr. Cook. Yes, sir.

Senator Murkowski. Was that a requirement or did you do that voluntarily?

Mr. Cook. We were asked to do that.

Senator Murkowski. Who asked you to do it?

Mr. Cook. I think one of the environmental groups suggested that to the Fish and Wildlife Service, in reviewing and commenting on our permit.

Senator Murkowski. And they suggested you put the derrick up, proceed to drill, and in May shut it down, put the well down, in compliance with your permit or whatever you had, and then put it back up again?

Mr. Cook. Yes, sir.

Senator Murkowski. That is fairly costly, is it not?

Mr. Cook. I do not know exactly what it cost. I expect probably on the order of $300,000 to $400,000.

Senator Murkowski. What remains there today?

Mr. Cook. Very little. There is some evidence of the reserve pit, which has been capped, and there will be some rehabilitation work done this summer to contour that. There is no evidence of where the ice airstrip was or the road. Virtually all that is there is a well marker post, which is required by law.

Senator Murkowski. I have got a couple of questions from the Committee staff. This was in Dr. Hair's testimony yesterday from the National Wildlife Federation, March 1987 report to Congress, stating that: Little data is available on permafrost in the region.

Anybody want to comment on that?

Mr. Weeks. Yes, Senator, I would be glad to. I think that statement is without merit, and I am prepared to submit to the Committee an abstract of some 4,000 pieces of research that have been done on permafrost.

Senator Murkowski. Well now, was there not a proposal some years ago for a gas line through the area, and even before that an alternative pipeline? Did those studies ever include permafrost analysis?

Dr. Maki. I do not have specific knowledge that they did. I would be very surprised if they did not.

Senator Murkowski. Anybody have any comments on that?

Mr. Herrera. The Arctic Gas study, which was a proposal to take the gas pipeline across the coastal fringe of ANWR into Canada, went at great length into permafrost considerations, for obviously reasons, yes.

Senator Murkowski. Is there any significant difference between the permafrost existing in Prudhoe Bay, where there is an 800 mile pipeline beginning and I do not know how many hundreds of miles of gathering line, and the permafrost over in ANWR?

Mr. Weeks. The Interior Department's report says the permafrost maybe does not extend as deep in ANWR. That is the only difference.

Senator Murkowski. When you say "as deep"——

Mr. Weeks. It may go down to only about 1,000 feet, whereas at places at Prudhoe it is 1,500 to 2,000 feet.

Senator Murkowski. So you are talking about the difference between 1,000 feet of permafrost in one place and 1,500 in the other.

Mr. Weeks. But for the purpose of designing surface facilities, there is no difference.

Senator Murkowski. Not much difference.

Dr. Maki, do you agree with that or is that in your field of scientific analysis?

Dr. Maki. No, I defer to the engineers on that one.

Mr. Patterson. Senator, I might offer one comment. There has been already comment concerning the seismic programs conducted in the area, and the permafrost, of course, is a very significant consideration in accurately interpreting and correcting, making the static corrections on the seismic data.

So I think that information also yielded considerable knowledge over the area.

Senator **Murkowski**. It is fair to say, then, that you do not feel Dr. Hair's contention that there is little data is basically a true statement?

Mr. **Weeks**. I would have to——

Senator **Murkowski**. Yes or no?

Mr. **Weeks**. I do not agree with that. You also have to consider we drilled 1,500 wells at Prudhoe and Kuparuk. Every one penetrated the permafrost.

Senator **Murkowski**. That proves you have got sharp drill bits.

Dr. Hair's report to Congress also stated that little is known about the impact of river flood plain mining, I assume for gravel. Is that true?

Mr. **Weeks**. I will have to disagree with Dr. Hair on that one again. In fact, I have another document that was prepared by the U.S. Fish and Wildlife Service and the U.S. Department of Interior, which is called "Gravel Removal Guidelines Manual for Arctic and sub-Arctic Flood Plains."

Senator **Murkowski**. Are you submitting that for the record?

Mr. **Weeks**. Yes, sir.

Senator **Murkowski**. I would take that for the record.[1]

And I believe there was a formal submission previous, which was?

Mr. **Weeks**. Right. This is the abstract of 4,000 pieces of research on permafrost.

Senator **Murkowski**. 4,000.

Mr. **Weeks**. Yes, sir.

Senator **Murkowski**. I see.

Mr. **Weeks**. The state has advocated flood plain gravel mining, done in the proper manner, for years. And this document is a how-to, if you will, for designing mining operations in river flood plains. It is supported by the U.S. Fish and Wildlife, Department of Interior.

Senator **Murkowski**. Has anybody indicated it is possible to drill an exploratory well with seawater? What is the down side to that? Why do we not do it?

Mr. **Herrera**. Well, when you are offshore there is an obvious benefit of utilizing seawater over fresh water. When you are onshore, it is usually the other way around.

There is a slight down side to using seawater, and that is that it makes the interpretation of your electronic logs—it gives you lots of data in the well bore when you have the total depth—a little more difficult. But on the other hand, routinely around the world, North Sea, offshore areas, California, Gulf of Mexico, seawater is used.

Senator **Murkowski**. Mr. Cook, do you have any reason to believe the Department of Interior has the results of your drilling with Arctic Slope or the Department of Natural Resources, state of Alaska?

Mr. **Cook**. No, sir. My understanding is that neither the Department of the Interior nor the state of Alaska DNR, Department of Natural Resources, have those data.

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[1] Retained in committee files.

Senator MURKOWSKI. Do you not have to give them something? Is there not some kind of a——

Mr. COOK. Senator, there is a requirement. We have a regulatory body in the state of Alaska, the Alaska Oil and Gas Conservation Commission, and they regulate drilling practices, safety in drilling, if you will. And we are required to submit the data to that agency. They in turn are required to use that only for the purpose of regulating field practices and drilling safety. They are not allowed to share it with other state agencies for the period that they are required to hold it confidential.

Senator MURKOWSKI. Which is this period that is under way now?

Mr. COOK. Yes, sir.

Senator MURKOWSKI. But is that information—if someone, an expert, had that information, would they have an idea of the results of the hole?

Mr. COOK. Oh, yes, sir, they would.

Senator MURKOWSKI. OK. Would you run through that again for the record, then, because that implies that that information is out there.

Mr. COOK. No, sir. It is on file with one state agency.

Senator MURKOWSKI. OK. Now, you are telling me that the state of Alaska then has the information relative to the logs on the Kaktovik well, and an expert geologist could interpret those and make a determination of whether it was a significant find or a dry hole?

Mr. COOK. Yes, sir. But that agency is required to maintain the confidentiality of those data. Its experts, its engineers, geologists, are allowed to use those data in the performance of their regulatory function, which is directed toward safe drilling practices in this instance, to ensure we have got a good casing program, adequate blow-out prevention, that sort of stuff.

Senator MURKOWSKI. So the state of Alaska has that, and that agency of the state of Alaska——

Mr. COOK. If I could just make a fine distinction, Senator, the State of Alaska has it in the person of this one agency that has very clear legal authorities. The State of Alaska in the person of the Department of Natural Resources does not have it.

Senator MURKOWSKI. What agency has it?

Mr. COOK. It is the Alaska Oil and Gas Conservation Commission, sir.

Senator MURKOWSKI. And that is an agency of the state of Alaska?

Mr. COOK. Yes, sir.

Senator MURKOWSKI. And there are members in that agency? There is more than one person?

Mr. COOK. Oh, yes, sir. I do not know exactly how many people have access to the data, Senator. But they have a staff, a professional staff of geologists and engineers and three commissioners.

Senator MURKOWSKI. Now, the other source, the Department of Interior?

Mr. COOK. The Department of Interior—the data have not been submitted to the DOI to my knowledge.

Senator MURKOWSKI. And there is no requirement that the DOI have that material?

Mr. COOK. No, sir. These are on private lands.

Senator MURKOWSKI. So as far as you know, the Department of Interior does not have any information where they could reconstruct the status of the Kaktovik well?

Mr. COOK. No, sir.

Senator MURKOWSKI. My immediate reaction, simply based on Washington experience, is that there are few kept secrets. But evidently this is one, because so far we have not heard any word of it leaking out. So that is I guess something meritorious to say for the ability of Alaska to keep a secret.

Do you share that general observation?

Mr. COOK. I think so. I think the one agency that has access to the data, that we are are required to file it with, has a very good reputation over the years for maintaining its legal responsibility to maintain confidentiality of data. To my knowledge, there has never been breach.

Senator MURKOWSKI. The reason I am going at that, Senator Bumpers was questioning why not and who has and so forth. And I think the record would reflect the status.

I want to go briefly, I guess just a couple more questions—and I know everybody is anxious to get out of here. I think there is a Paris Air Show somewhere. I do not know just where, but I know I am not going.

But anyway, the experience in NPR-4. And it was suggested, not seriously but nevertheless brought up yesterday, that since the industry has basically written off the area, I guess the Federal Government has written it off as a reserve, that it would be great to make it a wilderness.

Somebody, I think I, may have suggested, well, are you suggesting a trade, that we trade, put some wilderness in ANWR in relationship to opening up—excuse me—put wilderness in Naval Petroleum Reserve No. 4 and open up ANWR. And I was quickly reminded that that was not a potential solution.

But there have been a lot of wells, a lot of money expended. And the interesting thing, it was considered part of our national energy reserve; yet we had no production facilities, nor did we know how much oil was there. And I gather drilling has not been too promising, and somebody suggested that Government is too inefficient to drill anything and that is why they did not find it.

Can you give a 30 second version of the scenario in Naval Petroleum Reserve No. 4, and is there any logic to considering a wilderness a restricted area, or has the industry given up on it?

Roger Herrera?

Mr. HERRERA. Well, Senator, 123 wells have been drilled in that, I think it is, 23 million acres of land, over the last—since 1946, something like that. The more meaningful ones have been drilled in the seventies and eighties. Most of them have been drilled by the U.S. Government, using one agency or another, the Navy or the United States Geological Survey, and very few of them by industry.

When it was opened up to industry leasing, a matter of five, six years ago, the interest was relatively low level and not too much drilling has proceeded since that time. When you have 123 wells, none of which find the sort of accumulation you are looking for, you have to get a little pessimistic.

And I suspect that most people would be sort of willing to walk away from that area, albeit life is full of surprises and one surprise could come, for example, offshore in the Beaufort Sea, which could change the sort of geological concepts of the shoreline of NPRA. But that is a long shot.

The interesting aspect of NPRA in my view and this discussion on the Coastal Plain is the fact that all those wells have been drilled there and yet people are still willing to consider that a wilderness. They are willing to do that because it is a wilderness.

You cannot find those well locations. They reverted back to the background, sort of natural condition of the area. And it is the biggest untouched area in northern Alaska, not ANWR but NPRA.

Senator MURKOWSKI. Well now, there is drilling, you say 120, 130 wells. Is there not some environmental damage evidenced in the tundra? There are a few old airports that I know of that are still around.

What is the consequences of—what is left of the environmental disturbance that occurred?

Mr. HERRERA. Some of those wells were drilled a long time ago, when the ethics of environmental protection were not uppermost in people's minds. And certainly, the horror stories that one hears about activities on the North Slope in general were perpetrated in that area.

On the other hand, the USGS has made a conscious effort to rehabilitate some of the sites, and clearly some of them have just reverted to state themselves. Nature has done it for us. So I think that that is the answer you are looking for.

Senator MURKOWSKI. Would you support a proposed trade of wilderness, say putting, designating a wilderness area in Naval Petroleum Reserve No. 4 in return for opening up ANWR to exploration?

Mr. HERRERA. I personally would very seriously consider it, Senator, yes.

Senator MURKOWSKI. I see. Anybody on the panel object to that kind of a proposal?

[No response.]

Senator MURKOWSKI. Well, I can anticipate the answer that we would get, but it is nice to know that there is agreement here, at least on something by some group.

My next to the last question, which you will be pleased with, concerns the position of the state of Alaska. And it was not addressed in your testimony specifically, and I think it appropriate because there is some confusion, I think, in the Committee.

And if I can reflect on what I understand, the Governor of the State of Alaska, Governor Cowper, who was here appearing as a witness, emphasized very strongly his support for opening ANWR for exploration.

He indicated that his concern, from the standpoint of the concern for the caribou, was primarily in production. As a consequence, there is a reference to, once the area is defined where the concentration of caribou occur in the sense of calving primarily—and that, I think to quote his statement, could be a couple of hundred thousand acres, but in his formal testimony was left to be determined cooperatively with the state of Alaska, the Department of Interior, and the appropriate Federal agencies. Then a seven-year time frame would occur, at which time further studies were made, and then a decision would be made whether or not to—or excuse me—the area would be opened at the end of the seven years, unless Congress decided to close it, which would mean bringing the matter back to the Congress. And I happen to know the sensitivity of my colleagues concerning Alaskan issues and sometimes their span of attention gets a little limited as we take up a great deal of time on the Energy Committee.

So I am concerned with the merits of bringing that back for a vote in seven years. And then I am concerned about how we define the Catch-22 which I see in the State's proposal on production, which suggests that the concern is the impact associated with production, but unless you have production you are really not going to know of the impact; but even further, unless you have been able to identify the general area before and know whether the caribou frequented it, used it, or did not, you are not going to have anything to compare with.

And the Governor's reference to simulators, which I gather means constructing some kind of imitation rig or pipeline or road during the time that this area is closed to exploration, to determine whether there is going to be an impact, and that will help make the decision as to whether or not this sensitive area will be opened or whether Congress will veto and it will be closed.

And I am concerned on how you as an industry group focus in on the realization that there would, under the Governor's scenario, be leases put up in areas other than whatever the concentrated area turns out to be, and that being the confusion that I have, as expressed by my rambling statement.

Perhaps you can give me like treatment and respond. And if you could do it the numbers, it would be much clearer to me.

Mr. **Herrera**. There are 15 years of systematic information on the porcupine caribou herd and their calving areas in the Coastal Plain. The state of Alaska apparently has not made up its mind yet the implications of that information.

If they cannot make up their mind with that data, I doubt if another seven years of data is going to help any.

Senator **Murkowski**. We have to have something from the state of Alaska. This Committee has got to have something definitive presented by those that are the experts.

Mr. **Herrera**. We have argued long and put lots in the record, Senator, against this concept of a core calving area, which seems to be the hangup that the state of Alaska has. So we do not believe it exists.

Let us say for the sake of discussion it does and follow on through the scenario that the state is proposing. They are then wanting to prove that production facilities will not adversely affect—at least this is a nice, positive outcome—not adversely affect the caribou in that important area.

You know, we have got production facilities in the middle of the calving caribou herd at Kuparuk. I mean, that is a real thing. How are you going to produce a false thing which is going to give you better information than the reality that we already have.

Senator MURKOWSKI. The experts say that the porcupine is different, a different herd, different. The Eskimoes say they taste the same, so I do not know what to do. [Laughter.]

Mr. HERRERA. And obviously, I cannot argue that. I mean, we get into rhetoric very quickly. However, the practical problems of conducting an experiment of that nature tend to boggle the mind, irrespective of costs. I mean, what do you put out there? Do you put the noises of turbines?

Senator MURKOWSKI. You are talking about putting up a simulation?

Mr. HERRERA. That is right.

Senator MURKOWSKI. OK.

Mr. HERRERA. Simulating a production facility to see what effect that facility has on the caribou, the calving caribou. Very difficult to do it, very difficult to do it in a realistic fashion.

Let me give you an example. The Arctic Gas study in the seventies did exactly this to see the effect of their noise-making machinery, turbines in particular, on snowgeese. So they loudspeakered over the tundra the noises of the turbines and then observed what happened to the snowgeese in the vicinity.

And the snowgeese were scared, apparently, out of their life and moved away and did not want to have anything to do with this. We now today, in the last few years, have a real example of exactly that situation in the Lisburne oil field, and the results of very careful observation of how the snowgeese react to real turbines is almost 100 percent different from these simulated things that Arctic Gas carried out.

The snowgeese in the Lisburne oil field habituate to the noise and are not terribly offended.

Senator MURKOWSKI. In other words, the noise is there all the time?

Mr. HERRERA. That is right. That is just one of the problems of simulated experiments of this kind.

I think if the state of Alaska can come up with a proposal and people can look at it and critique it in a rational fashion, we will be better off. It is very difficult for us in the industry who have thought through this thing to come up with something which we think will work.

Senator MURKOWSKI. So you are telling the Committee that the concept of simulators are very difficult to recreate actual production activities, and you question the practicality. Then how do we relate to the state's concern or the Governor's concern of the potential impact of production as far as dislocating the caribou activity?

And Dr. Maki, since the statement has been made by Mr. Herrera that he believes that no core calving area exists, I wonder if you agree or disagree with that statement?

Dr. MAKI. Well, as I tried to point out in my comments, in walking through the information since 1972, when we look at the results of the aerial surveys describing calving frequency and calving distribution, it is clear that a wide range of habitat is utilized, and that we cannot find anything that would really be described as a core calving area.

The most recent years' information, 1983 and 1984, which we have plotted, indicate that as low as 15 percent of the herd use this "concentrated area." So I would be at a loss from an experimental design standpoint to be able to put together the proper study to even begin to quantitate the impacts, potential impacts of development.

Senator MURKOWSKI. So you say there is in your opinion no core calving area, based on your evaluation?

Dr. MAKI. Indeed.

Mr. HERRERA. Senator, might I make——

Senator MURKOWSKI. Now, before we leave that, how do you explain the five eminent biologists that the state has retained that indicate there is a core calving area?

Dr. MAKI. I just refer back to the actual field data which we have in place.

Senator MURKOWSKI. So you challenge their interpretation of that field data?

Dr. MAKI. Absolutely. Take it one year at a time, simply look at the calving distribution that has occurred, the calving frequency of use, and you find that, as we are currently seeing again this year, the majority of calving is occurring away from what is referred to as a concentrated calving area in the 1002 area.

It appears that that concept is not overly valid in referring to the calving distribution of the porcupine herd.

Senator MURKOWSKI. Mr. Herrera, you were going to say something?

Mr. HERRERA. Senator, I do not agree with the state's concern. But if they insist on such an experiment, why not make it a real experiment and drill an exploratory well in that area in the summertime, rather than in the wintertime?

Senator MURKOWSKI. Who drills it?

Mr. HERRERA. An operator that has a lease in that area, because I do not agree with the concept of closing that area forever, for this reason. I mean, if there is a lease sale at all in the Coastal Plain, so-called core calving area, on condition that—and this is in the stipulations so people can know what they are buying beforehand—that exploratory wells in that area for the first five years or whatever have to be drilled in the summertime.

Now, that is a problem, but nevertheless it can be done. We know that. Then you have the real life situation of the impact of certainly a well on the caribou, and you can study the thing to death.

The point is that if there is a discovery there you have your data, your hard data, and the operator, no matter where a discovery is made on the Coastal Plain, will have to go to a full environmental impact statement pertinent to development.

And I presume, I am sure, the Secretary of the Interior will have the ability not to allow that development if it would adversely impact the caribou.

Senator MURKOWSKI. Well, how do you see developing—and obviously we are going to have legislation to hold hearings on and we are going to be holding hearings in Alaska at some time in the not too distant future, at a date yet to be determined.

What area is determined to be sensitive, it is defined to be how much of the ANWR area? Do you see the biologists coming to a general conclusion on what area is sensitive, so it would either be excluded or given special consideration, as you have suggested, in the lease process?

This certainly is not going to occur from the action of this Committee. It is appropriate that it come from the state, the industry, the environmental community, the biologists and so forth.

Mr. HERRERA. Senator, we have argued that the whole of the Coastal Plain is sensitive at certain parts of the year, and that we say the calving patterns of the caribou are more or less random and could be anywhere within the Coastal Plain.

Obviously, any activity, no matter what it is, must take that into account if by happenstance that activity is in the area where calving is taking place in that particular year. So my answer would be that you have got to retain flexibility in your mitigating measures.

And you close your roads to all traffic, all activity, if the caribou are in the vicinity of the road in that particular year. You do whatever is necessary to lessen the impact of any facilities if the caribou are surrounding those facilities.

I mean, you act in a flexible fashion depending on where they are. If they are not there, you can go about your business.

Senator MURKOWSKI. Would you be willing to give a good faith effort from industry that, between yourselves and the Department of Interior and the various agencies and the state of Alaska, that you would be willing to be bound by studies as they occur further defining the impact of activity on the porcupine herd as it migrates in and about the ANWR area, if you had a clear policy on leasing so you knew what was going to be leased and what was not?

Mr. HERRERA. I think we are already bound by that, those considerations on existing leases outside of the ANWR, yes, Senator.

Senator MURKOWSKI. I do not want to spend too much time on this point, but it seems to me that we are hung up. And as a member of the Committee, as opposed to my obvious commitment to the state of Alaska, I think we are at a point where we have not got a definitive acreage to consider, let alone the merits if we did, considering what the area consists of from the standpoint of a concentrated calving area and whether we have a valid scientific analysis of whether this area, if there were drilling, would simply temporary cause a relocation of the caribou.

And since we do not know what was on a specific piece of land and we put a simulation up, unless you had a comparison capability you could not make a true scientific evaluation of the simulator. So I think somebody is going to have to give on this or define or clarify.

And I think I can speak for a number of members of the Committee that I have talked to that say, until that is done we are not going to be able to really consider the merits of what we are talking about as we consider the lease prospect. So that is really up to you folks, and I hope I have enunciated it in a manner in which you can understand it.

The last question, believe it or not, and it was brought up time and time again yesterday, is the unique ecosystem, unlike any other, and the fact that, what have we got, 56 million acres in wilderness.

My question is what constitutes a unique ecosystem unlike any other, that would not be done better in 80 million acres or 30 million acres? This was a point that was continually brought up and I think deserves some comment from your side for the record.

And I know you have touched on portions of it, but respond to it in general, unique ecosystem unlike any other—in spite of the fact that we have got three radar stations in there, one of which is active, we have got a village in there, Kaktovik, which is very active. We have already got a well drilled in there, which only a few people know about.

Dr. MAKI. Senator, we are hard pressed to define a totally unique character for the area. It is typical tundra as you find distributed across the North Slope of Alaska. The flora and fauna species utilizing the area are distributed commonly across Alaska and Canada.

As was mentioned earlier by this panel, maybe the most unique aspect of the area is its high potential for holding oil and gas reserves. But strictly from an ecological standpoint, the Coastal Plain represents a continuum of habitat and ecology which we find contiguous across the Alaskan North Slope.

Senator MURKOWSKI. Does anybody else want to add anything to the uniqueness of the ecosystem, something that we are very concerned and very proud to have, and I guess really need to relate to the significance of it as it relates to the acreage.

And much was made yesterday about the fact that a lot of it is not really in the Coastal Plain, but is in the foothills, and as a consequence you cannot use 56 million acres, you have got to use 20 million.

Mr. HERRERA. Senator, to a limited extent I dealt with this in my opening statement, and it is certainly dealt with in this white paper which will be put into the record. But the various Arctic land forms and biological values which one finds in ANWR are clearly seen elsewhere on the North Slope and throughout the North Slope.

And one can make the realistic suggestion that the values that we are talking of in ANWR are all found, and perhaps in bigger and better quantities, if you will, in the NPRA area or the western part of the North Slope. We have the same mountains, the same Coastal Plain, bigger caribou herds.

Senator MURKOWSKI. Same birds?

Mr. HERRERA. Bigger rivers, more bird species to the west and to the east. And everything that we are talking about is represented there, so that there is nothing which is totally unique about the 1002 area.

Senator MURKOWSKI. Thank you, gentlemen.

I want to clarify a point. The submissions of the volume of data that were submitted will be on file and not in the record. Otherwise, we would have to make a special appropriation to get it printed, and the Committee certainly does not have that budget.

I want to thank Tom Williams, who has sat through four hearings without missing a beat, and Tony Bevenetto. Tony is recognized, as well.

I want to thank our court reporter. The one we had yesterday promised she would never come back again, and I notice that we have a new one today who is using the more modern technology.

And this marks the end of our scheduled oversight hearings. We have had the Interior Department, the state of Alaska, the environmental community, and today the industry. We thank you for your contribution to I think a complete record on the subject.

And we will proceed now with hearings on the legislation to be announced at a later date. On behalf of Senator Bennett Johnston, the Chairman of the Energy Committee, we thank you, and thank you in the audience who sat through these rather lengthy hearings. We wish you a good day and a pleasant summer.

The hearing is adjourned.

[Whereupon, at 1:10 p.m., the hearing was adjourned, subject to the call of the Chair.]

APPENDIXES

APPENDIX I

Responses to Additional Committee Questions

United States Department of the Interior
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

August 5, 1987

Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

This is in further reference to your letter to Secretary Hodel of June 17, which enclosed questions submitted by Senators Bumpers, Evans, and Domenici for the hearing record on the Arctic National Wildlife Refuge.

As indicated in the June 26 letter to you, we were considering questions posed by several committees in hearings on this matter; and we apologize for any delay in getting back to you. We are enclosing our responses to the questions included with your letter in the order they were raised.

I hope this information is helpful to you.

Sincerely,

J. Stephen Britt
Assistant to the Secretary for
Congressional and Legislative Affairs

Enclosures

cc: Honorable Dale Bumpers
Honorable Daniel J. Evans
Honorable Pete V. Domenici

Senator Bumpers

Question 1. In your testimony before this Committee on Tuesday you indicated that the Canadians were considerably disturbed because the ANGTS system has not been completed, therefore leaving the Canadian segments of the ANGTS prebuild underutilized. Did the United States government make any commitments to the Canadian government regarding the ultimate completion of the entire ANGTS system? If so, what was the nature of those commitments? Did the Canadian government authorize the construction of the Canadian segments of the ANGTS prebuild on the basis of those commitments?

Answer. We believe that the U.S. government has basically fullfilled the commitments made in relation to the Alaska Natural Gas Transmission System project. Certifications, permits, authorizations, etc., have been given as appropriate to the project sponsor's need in planning, pre-building, construction and operational aspects. This Department is prepared to process and issue such additional permits or authorizations as may be required by the project sponsor's further planning or construction schedule. As necessary and appropriate, this would be done in consultation or coordination with other agencies such as the Office of the Federal Inspector, Department of Energy, and the Corps of Engineers.

It would appear from a review of activities that the Canadian government provided for ANGTS pre-build construction on the 1980 commitment that the U.S. government was satisfied that the entire ANGTS would be completed as proposed by the project sponsors.

Senator Bumpers

Question 2.

I understand that the Government of Canada has requested consultations with the Government of the U.S. under Section 8 of the Agreement on Principles between the two countries. Does the Administration intend to comply with this request and have consultations before formally recommending the export of natural gas to Japan?

Answer

The Department of the Interior is not directly involved in this process. We have provided a copy of this question to the State Department. We understand that Department can provide further details on consultations on this matter. Therefore we feel this question should be answered by them.

QUESTION

3. Your testimony described the study authorized by the President and his required findings that the export of Alaskan gas would have no adverse impact on national security or raise the price of gas domestically. What law requires such a study and finding to be made? Is the study and required finding to be made at least in part pursuant to Section 12 of ANGTA which provides that, in addition to the requirements of the Natural Gas Act and Section 103 of the Energy Policy and Conservation Act, that the President must make and publish an express finding that exports will not diminish the total quantity or quality nor increase the total price of energy available to the U.S.? What procedures will be used to conduct the study and issue the required finding?

ANSWER

The Presidential finding described in the testimony is that which is required by Section 12 of the Alaska Natural Gas Transportation Act, 15 U.S.C. § 719j. Under Section 12, before any Alaska natural gas in excess of 1,000 Mcf per day may be exported, the President must make and publish an express finding that such exports will not diminish the total quantity or quality nor increase the total price of energy available to the United States. The statute does not require a finding that such exports will have no adverse impact on national security. Section 12 does not specify the nature of the evidence necessary to support the President's finding, nor does it specify the procedures to be followed in making the finding. These matters are left to Presidential discretion and will be developed and implemented by the Executive Office of the President, as has been done in the past with regard to similar Presidential decisions.

Senator Bumpers

Question 4.

Are you aware that a number of studies have concluded that the current deliverability surplus will evaporate by the end of 1987 or 1988? If those studies are accurate, do you believe that the required findings under Section 12 of the ANGTA can be made?

Answer

This is a question which would have to be addressed in any Presidential finding under Sec. 12.

Senator Bumpers

Question 5. Congress determined in the ANGTA of 1976 that a "natural gas transportation system for delivery of Alaskan gas to United States markets is in the national interest" (Section 2(3)). Do you believe that the Administration can authorize the export of Alaskan natural gas to Japan instead of "to United States markets" without coming to Congress and seeking an amendment to ANGTA?

Answer We find no legal requirement in the ANGTA (or the two acts referred to therein), or in the Mineral Leasing Act of 1920 that would require an amendment to the ANGTA in order to authorize the export of Alaskan natural gas.

Senator Bumpers

Question 6. Are there any other procedures or requirements which must be followed before Alaskan natural gas exports to Japan or other foreign markets could take place? What, precisely, would the procedural path be?

Answer. Depending on the method and routing of a transportation-delivery system, there would be various procedures and requirements, other than Section 12 of ANGTA, before export could take place. Some of these fall within the purview of this Department, i.e, obtaining a right-of-way across Federal lands under the Mineral Leasing Act of 1920 (30 U.S.C. 185). Other procedures or requirements would affect other Departments and agencies. We also must not lose sight of the role that the State of Alaska has in any transportation of natural gas produced within the State.

To provide a precise procedural path for other than the requirements of Section 12 of ANGTA would be difficult without a proposal. Generally:

- a proposal would be reviewed for legal and technical correctness
- preparation of an Environmental Impact Statement
- discussion with proponent and preparation of appropriate authorization documents, including appropriate stipulations for protection and mitigation of environmental impacts
- issuance of necessary authorizations
- construction of facilities to produce, gather, and transport the natural gas
- monitor the operation as appropriate.

Senator Bumpers

Question 7. May the authorization be granted without the consent of Congress, particularly since it determined in ANGTA that "it is the intent of Congress to exercise its constitutional power to its fullest extent" (Section 3) with respect to a delivery system for Alaska natural gas?

Answer. Some of the authorizations that would be involved with the transportation of Alaskan natural gas provide for notice to the Congress. For example Section 28 of the Mineral Leasing Act provides that a right-of-way for a pipeline of 24 inch or larger diameter cannot be issued until sixty days (not counting days on which the House of Representatives or the Senate has adjourned for more than three days) after a notice of intention to grant the right-of-way, together with the Secretary's or agency head's detailed findings as to terms and conditions he proposes to impose, has been submitted to such committees, unless each committee by resolution waives the waiting period (30 U.S.C. 185 (w)(2)).

Beyond notifications of this type, we find no legal requirements to obtain the consent of Congress.

Senator Bumpers

Question 8.

Press reports indicate that TAGS would have a capacity of 14 million tons of LNG annually and that operating reservoirs could provide 26 trillion cubic feet of gas, sufficient to operate TAGS for 36 years. Are these "operating reservoirs" the same reservoirs intended by Congress to provide the support for ANGTS?

Answer

Yes. The 26 trillion cubic feet of gas is the only source of proven gas on the North Slope.

Questions from Senator Daniel J. Evans for Secretary of the Interior, Donald Hodel, Regarding Arctic National Wildlife Refuge Hearing of June 2, 1987, Before the Senate Energy and Natural Resources Committee

Question 1.

The Department of the Interior has recently made recommendations to open both the coastal plain of the Arctic National Wildlife Refuge, and offshore areas along the Atlantic, Pacific and Gulf coasts for oil and gas development.

> Why should we open the arctic coastal plain and sensitive offshore areas at the same time? Don't these actions have the appearance of 'energy panic'? Why not tap one source and then the other instead of both simultaneously? Shouldn't we save one as some type of 'ace in the hole'?

Answer

> The Department has recommended opening both the coastal plain of ANWR and additional OCS areas because it is wise resource management and energy policy. We have consistently taken the position that as technology develops to enable us to explore for and develop oil and gas in a manner that is consistent with our goals of protecting the environment, then we need to open these new frontiers.
>
> These actions do not have the appearance of "energy panic". "Energy panic" would be when we would encourage the oil companies to explore for oil without regard for the environment. On the contrary, we have implemented strict standards for the exploration, development, and production of oil and gas on all Federal lands.
>
> Due to the uncertainty in oil exploration we cannot concentrate on one area at a time. Both the ANWR and OCS proposals are the result of years of analysis, litigation, and debate. That they have come out simultaneously is coincidence. The fact that they are both required is not. The potential impact of this nation's growing dependence on imported oil is a long-term increasing threat to our security and economy. Cheap imported oil fosters growing dependence. From 1973 to 1978 and from 1979 to the present, we have seen the supply of oil constricted and the corresponding response of the market. The initial response was a rapid increase in oil prices. The resultant conservation reduced demand, and production increased in response to the higher prices. In 1979 OPEC artificially avoided completion of the market response by constricting production and raising prices. But 1986 has shown us the result. Expanded worldwide production has combined with stagnant demand to force lower oil prices.

Senator Evans

#1(cont.)

But a significant factor is that the production increases were not in the U.S. The higher prices enabled the U.S. to maintain production through higher cost enhanced production and through Prudhoe Bay production. These options will not be available in the future since many of these opportunities were depleted during the years of high prices. We need to explore new areas to find out what options are available.

Although we are trying to open ANWR and more of the OCS at the same time, this does not mean that they will be explored, developed, and produced at the same time. At best ANWR could be producing by the end of the 1990's. Some OCS areas could produce sooner, others later. The actual timing will depend on three principles: when the areas are opened up, when the economics justify going into these areas and what is found. Another factor affecting the North Slope is the anticipated future decline of Prudhoe Bay production. The excess capacity of TAPS will have a significant influence over the development of other North Slope and related OCS fields.

As for saving an area as an "ace in the hole", this requires that you know it is an ace and that you can play it when it is needed. For ANWR and the frontier OCS areas, we do not know what is available. Even if they do have oil, it will take 10 years or more just to start playing them. The past has shown that a very debilitating economic cycle related to oil can be over in less than 10 years.

Senator Evans

Question 2.

The coastal plain of ANWR is the only portion of the Alaska coast presently closed to oil and gas leasing.

Why should we destroy the only place in North America where the complete range of Arctic ecosystems is still pristine for an oil supply that, if found at all, would only supply the U.S. with 200 days of oil? What is proper mitigation for such an action?

Answer

The 1.5-million acre 1002 area is bordered to the east and south by more than 8-million acres of designated wilderness. This includes the coastal plain east of the Achilik River to the Canadian border. From the Canadian border east is Canada's 3-million acre Northern Yukon National Park. Given this existence of extensive lands already set aside for wilderness and other preservation purposes, the 1002 areas's value as statutory wilderness is not unique.

It is a false assumption that the coastal plain will be destroyed by oil exploration and development. If exploration indicates that no commercial oil and/or gas is present, then there should be no significant impact on the environment. Experience in Prudhoe Bay has shown that development and production can proceed without destroying the environment. Consolidation of project facilities and other measures recommended in the report to Congress to mitigate impacts to fisn, wildlife, and their habitats will also minimize impacts to the area's wilderness qualities. Planning development activities so that they occur as far as possible from the existing wilderness boundary would buffer that area from noise or visual disturbances. With less than 1 percent of the 1002 area expected to be directly impacted by oil development, large areas within the 1002 area will remain undeveloped and essentially in a wilderness state.

Although at the 3.2 billion barrel mean resource level, there would be the equivalent of approximately 200 days of oil in ANWR at total U.S. consumption of 16-million barrels per day, the TAPS capacity limits the amount of oil produced per day currently to 1.8 billion barrels. Thus, it would take years to produce all of the oil in ANWR, not just 200 days. There is a 5% chance that ANWR would be as least as large as Prudhoe Bay, which would be the equivalent of more than 600 days of total consumption in the U.S. and require many more years to produce.

The attachment to Senator Domenici's question #9 provides a fuller picture of the importance of potential ANWR production.

Senator Evans

Question 3.

You have stated repeatedly that there is a grave need to open up the ANWR area for oil and gas leasing so that the United States may reduce its dependence on foreign oil and prevent an oil shortage such as the one that resulted in the oil embargo in the early 1970's. Further, it has been estimated that, at best, oil and gas from ANWR could contribute only 4% of our nation's energy needs.

If the Administration believes this country if facing a future energy crisis, why then has it not, and why have you not recommended, that we adopt a national comprehensive energy policy that includes conservation measures as well as development? Isn't it shortsighted to focus only on a finite oil resource as the answer to our nation's energy problems.

Answer

There are many ways to prepare for a future energy crisis. Some aspects are appropriate for government intervention, but the principal forces are encompassed in the market. Instead of trying to regulate and force the market to do what a few policy-makers think is best, we need to understand the market and the potential problems the nation faces. With this knowledge we can provide incentives so that the market can be prepared to avoid or, if necessary, respond to a crisis.

The Department of the Interior, in its roles as manager of Federal mineral resources, contributes to the goal of better energy security and a stronger national economy through its minerals management programs. We provide the market the opportunity to work by opening Federal resources for exploration and development in a manner consistent with environmental values. To do otherwise would unduly constrain the market similar to an OPEC embargo.

A more comprehensive energy policy review was described in the recent DOE report "President's Report an Energy Security".

4. The Department of the Interior has already traded away some of the subsurface oil and gas rights within the Arctic Refuge to a native corporation. Has the Department of Interior been engaged in further discussions to trade subsurface mineral rights in the area for lands held by native corporations in other parts of Alaska? If the Department of the Interior has engaged in discussions of this nature, why are you doing so in advance of a Congressional decision about oil and gas development in ANWR? (Senator Evans)

ANSWER: For approximately two years, the Department has been discussing with Native corporations the possibility of exchanging federal oil and gas interests in the Arctic Refuge for Native inholdings in other Alaska refuges. These discussions have been held independently from the 1002 area assessment and associated Secretarial recommendation contained in the report to Congress. The Department has made it clear from the outset that any exchange agreements (1) would be forwarded to Congress for review and approval, (2) would be consistent with the Secretary's 1002 recommendations, and (3) would be contingent on legislation--if any--opening the 1002 area to further oil and gas activities. The timing of these discussions has reflected the nature and complexity of the exchanges, the willingness of the corporate entities to enter into discussions, and the unparalleled opportunity the exchanges represent in terms of the quality and quantity of fish and wildlife habitats being offered. However, it has always been the Department's position that Congress would have ultimate approval authority for any further exchanges involving oil and gas rights in the Arctic Refuge.

Senator Evans

Question 5.

The economic assumptions built into the Department of the Interior's analysis about the oil and gas potential at ANWR are considered by some to be quite favorable. The Department's recommendation is based on oil and gas prices in the $30-$40 per barrel range. There are some who would argue that this is an unrealistic optimistic assumption.

Did the Department of the Interior conduct an analysis of the economic viability of developing ANWR if oil prices were comparable to oil prices today? I would like to see an analysis of the viability of developing oil and gas at ANWR under some economic assumptions that reflect more of a worst-case scenario.

Answer

The Department has developed, as part of the ongoing analysis, various scenarios which take into account less optimistic assumptions. However, the Department did not conduct an analysis of the economic viability of developing ANWR if oil prices remained comparable to oil price today. The present price level is approximately $18-$20 per barrel, which is up from about $12 per barrel 15 months ago. None of the many oil price, supply, and demand estimates published in 1986 and 1987 is based on the continuation of those price levels. The concept conflicts with intermediate- and long-range domestic and international price, supply, and demand trends. There is general agreement among oil and gas forecasters that future prices will be higher. This is why the Department prefers to use ranges when it develops its analyses.

6. It is my understanding that some wildlife biologists, including the biologists for the State of Alaska, recommended that a core-calving area be protected? Why does the Department of the Interior dismiss the importance of a core calving area and recommend leasing of the entire 1002 area? Didn't the draft report state that there would be a major impact on the caribou herd if oil and gas leasing were allowed in the 1002 area? Can you explain why in the final report, the potential adverse effects on the size of the caribou herd were minimized? (Senator Evans)

ANSWER: At a caribou impact analysis workshop sponsored by the Fish and Wildlife Service in November 1985, the majority of participating biologists agreed that the area of sustained calving use by the Porcupine caribou herd should be deleted from any leasing which might be authorized in the area. Those biologists included caribou researchers from the Fish and Wildlife Service, Alaska Department of Fish and Game, private Alaskan and Canadian consulting groups, the University of Alaska, University of Victoria, British Columbia, and the oil industry. The area of sustained calving use was generally identified at the workshop. However, actual delineation of the area and designation as the "core calving area" were subsequently made by the Fish and Wildlife Service.

As stated in the workshop report (Elison et al., 1986), characterization of a core calving area was a subjective determination and the boundaries of such an area are dynamic. Data leave little doubt that there are important birthing areas in spite of some broad variations from year to year (see figure II-5 and plate 2A from the final report). However, based on further Fish and Wildlife Service review and further consultations with Canada, it was determined that the area was not unique or irreplaceable and that it was questionable to conclude that the expected displacement would be sufficient to threaten the viability of the herd. It was also determined from comments received on the draft report that the concept of a core calving area was easily misinterpreted and confusing. Therefore the use of the term was discontinued in the final report, although it is recognized that the Upper Jago River area is the most frequently used area of concentrated calving.

The draft and final reports are consistent in their prediction that the impacts on the Porcupine caribou herd could be major. The major impact described in the report refers to widespread, long-term changes in habitat availability or quality within the 1002 area. The most likely effect to the Porcupine caribou herd would be displacement from historically used habitats. Although there is a risk that a population decline resulting from loss of habitat and reduction in habitat values could occur, that potential cannot be quantified, nor can the size of any decline be estimated.

The Department recommended full leasing to include this area in the belief that potential disturbances can be minimized by facility consolidation, siting considerations, timing restrictions and other mitigation measures. As described in the final report, no appreciable decline in the population size of the Porcupine caribou herd is expected to occur as a result of oil and gas development in the Upper Jago River area, or other portions of the 1002 area.

Senator Evans

Question 7.

Congress must take action to affirmatively open up the coastal plain of ANWR for oil and gas development. If no affirmative action is taken, the area will remain closed. The Department of the Interior has recommended opening the area to full oil and gas leasing. Let's assume for this question, that Congress does decide to open the area for leasing.

Can you describe for me what would be the ramifications on the oil and gas operations if drilling activity were to be shut down during the summer months to avoid the period of greatest impact on the caribou herd? To what extent could this type of restriction be effective in protecting wildlife? What do you think the Department of the Interior should require of the developers to ensure the highest level of environmental protection? Is it feasible to mandate that the area be returned to as natural a state as possible, and what would that require of the oil and gas developers?

Answer

This response is based on the assumption that the Congress has opened ANWR for leasing and considers the ramifications on oil and gas operations if drilling activity were shut down from early May until the end of July to avoid the impact of activities on the Porcupine Caribou herd. Drilling activity must be separated into two stages, (1) exploratory drilling and (2) development drilling and the construction of the infrastructure that would be required to produce oil and gas if a field is discovered. Exploratory drilling on the North Slope is conventionally conducted from August to May. Most wells can be drilled to total depth during this period and when necessary, additional drilling is accomplished during a second season. The effect of drilling shut-down from May to July would, therefore, be nominal on oil and gas operations. If a discovery is made, additional drilling would conventionally be required to delineate the geologic structure and determine if it is a commercial field. This drilling could also be accomplished during the "winter" months which also would have nominal ramifications.

If an oil and/or gas field is discovered and demonstrated to be economically producible, the situation, however, changes. Production operations, development drilling, and the construction of facilities would be conducted on a year round basis. The Government could require that locations and schedules be designed to minimize or eliminate impacts on the caribou and other wildlife.

The Department of the Interior would develop stipulations, regulations, and procedures for ANWR leases designed to ensure that the environment is protected, as is done for all leased public lands. Similarly, current Departmental procedures require operators to return leased areas to as near their original state as possible after utilization.

Senator Domenici

Question 1.

What level of receipts would be generated for the Federal Government if:

- a. The coastal plain produced 0.6 billion barrels of oil?
- b. The coastal plain produced 3.2 billion barrels of oil?
- c. The coastal plain produced 9.2 billion barrels of oil?

Answer

A full analysis of ANWR for estimating receipts at the alternative reserve levels was not run. From the 1002 report the revenue estimates from 3.2 billion barrels of production is $38 billion (undiscounted) and $8 billion (discounted).

The corresponding approximation for 0.6 billion barrels would be about $6 billion and $2 billion. Similarly, for 9.2 billion barrels the estimates are over $150 billion and $35 billion.

As noted in the 1002 report, these figures include some native and State lands on the coastal plain. Thus, that portion of bonuses, royalties, and rentals would go directly to those organizations. Additionally, a significant portion of these funds would be shared with the State. Only the Federal corporate income tax would accrue directly to the Treasury. The proportion of revenues from this tax will increase as the resources increase.

Senator Domenici

Question 2.

How many acres of Federal land in Alaska currently are closed to oil and gas leasing?

Answer

Stewardship of the majority of Federal lands in Alaska is shared primarily by four agencies. Each of those agencies and the amount of areas currently under their jurisdiction that are closed to oil and gas leasing are listed below.

Agency	Total Management Acres	Closed to Oil and Gas
National Park Service	50,363,483	50,363,483
National Forest Service	22,811,098	7,299,551
Bureau of Land Management	75,000,000	43,026,520
Fish and Wildlife Service	73,000,000	16,000,000
Totals	221,174,581	116,689,000

Percent closed = 52.8

These figures are estimates from various agencies. Also, the Fish and Wildlife Service has ongoing studies in land management to determine if additional areas should be closed to oil and gas activities, so their values could change anytime, most likely to substantially increase the area closed to oil and gas development.

3. How many acres are encompassed in the concentrated calving areas for caribou on the coastal plain? (Senator Domenici)

ANSWER: For the 15 years for which data are available (1972-1986), calving by the Porcupine caribou herd has occurred throughout 3-million acres within the Arctic National Wildlife Refuge and Canada. Approximately 828,000 acres (28 percent) are within the 1002 area; concentrated calving has occurred in a variety of different areas, on and off the 1002 area, as depicted by figure II-5 and plate 2A in the final report. The Upper Jago River area, which has been repeatedly used for concentrated calving in at least 7 of the 15 years, consists of approximately 84,000 acres.

4. What impact would opening the coastal plain to leasing have on the concentrated calving areas? (Senator Domenici)

ANSWER: As described in the final report (pages 118-124), if the entire 1002 area were made available for leasing, oil production in the repeatedly used concentrated calving area could have a major effect on the Porcupine caribou herd. The effect would manifest itself as a widespread, long-term change in habitat availability or quality which would likely modify natural abundance or distribution of the herd in the 1002 area; a change in distribution could reasonably be expected. Although there is a risk that a population decline could occur, no appreciable decline is expected.

5. In the Draft Coastal Plain Resource Assessment, it was suggested that leasing of the coastal plain be phased so that the concentrated calving areas of the Porcupine Caribou herd would be the last to be explored and developed. This suggestion was deleted from the final report.

a. Why was this suggestion deleted from the final report?

b. Does the Department anticipate adopting such a phased approach to leasing if Congress authorizes oil and gas leasing on the coastal plain? (Senator Domenici)

ANSWER: (a) We have not ruled this option out. However, we decided that it would be best not to restrict our flexibility to conduct a properly-timed, environmentally-sensitive lease program. During an ordinary lease program there is a substantial opportunity for discussion and analysis of each potential area to be included or excluded in a sale. The review process for each sale provides considerable opportunity for state involvement and public input.

(b) There is a lot of preliminary work that goes into the planning of a properly-timed, environmentally-sensitive lease program. We have not yet designed the mechanics for a lease program on the coastal plain of the Arctic National Wildlife Refuge. As noted above, a phased approach is certainly a possibility.

6. Why was Alternative B of the Coastal Plain Resource Report, which would have limited leasing by excluding concentrated calving areas from oil and gas leasing, not the preferred alternative?

ANSWER: It is the position of the Department that an orderly oil and gas leasing program for the entire 1002 area can be conducted in concert with America's environmental goals. Alternative B would lower the oil resource estimate for the 1002 area by 25 percent and reduce the mean expected net national economic benefits by about 30 percent.

The primary difference in environmental concerns between Alternatives A and B is the unlikely but potential risk to the Porcupine caribou herd from oil production in the Upper Jago River area. Such activities are likely to displace portions of the herd from that area, but it is probable that the displacement would take place without adverse population effects. The mere presence of such a risk make no compelling case for forgoing the potential for billions of barrels of oil and the attendant national economic and energy security benefits. In addition, the long period of time required to bring oil into production provides ample opportunity to develop any additional mitigation measures as may be necessary to address unexpected impacts.

Senator Domenici

Question 7.

How would you rate the chances of finding oil on the coastal plain if the concentrated calving areas were excluded from leasing?

Answer

Utilizing the same assumptions as in the 1002 report, the probability of finding at least 1 economic field would drop from 19% to about 15%.

Senator Domenici

Question 8.

What would the oil resource estimate for the coastal plain be if the concentrated calving areas were excluded from leasing?

Answer

The most frequently used concentrated calving area for the Porcupine caribou herd includes all or part of Block D located in the southeastern part of the 1002 area. If Block D is excluded from leasing, the mean in-place oil and gas resource estimates would be 12.2 billion barrels of oil and 27.1 trillion cubic feet of gas, respectively. This compares to 13.8 billion barrels of oil in-place and 31.3 trillion cubic feet of gas in-place for the entire 1002 area.

The mean economically recoverable oil estimate would be reduced by 25 percent from 3.2 billion barrels to 2.4 billion barrels. Gas is not considered to be economically recoverable in the time frame analyzed.

Senator Domenici

Question 9.

Assuming that the concentrated calving areas are excluded from leasing and that an economic oil and gas field is found:

a. How much oil is likely to be produced from that field?
a. When could that field be brought into production?
b. For how many years would that field be in production?
c. What percentage of US demand would that field supply?
d. What percentage of US production would that field account for?
e. What would be the impact of such production on US oil imports?

Answer

It is not clear whether the question is referring to any single field or to the rest of ANWR outside of the calving area. Although any single field could range from the minimum to more than Prudhoe Bay, the analysis we have is based on ANWR outside of the calving area.

a. At the mean resource level, the estimated oil production excluding the calving areas is 2.4 billion barrels of oil. This is the production estimated at the mean resource level for the limited leasing Alternative B, as described in the ANWR Report. At the 5% level the production is about 7 billion barrels.

a. Oil production is assumed to start about the year 2000.
b. The field would be in production for about 30 years.
c. As shown in Table VII-2, page 179 ANWR Report, initial production under the limited Alternative B in the year 2000 would account for 0.6 percent of U.S. oil demand in 2005 and 1.8 percent in 2010.
d. The same Table VII-2 shows that estimated oil production under the limited leasing Alternative B would account for 1.2 percent of total percent in 2010.
e. This production would account for 1.4 percent of U.S. oil imports in the year 2000, 6.2 percent in 2005, and 3.6 percent in 2010.

The attached discussion and charts regarding ANWR production and imports may help bring this into perspective. Excluding the calving area would reduce ANWR production by about 25% for the mean and 5% levels, although the 3.2 and 9.2 billion barrel levels are still possible.

ANWR PRODUCTION AND IMPORTS

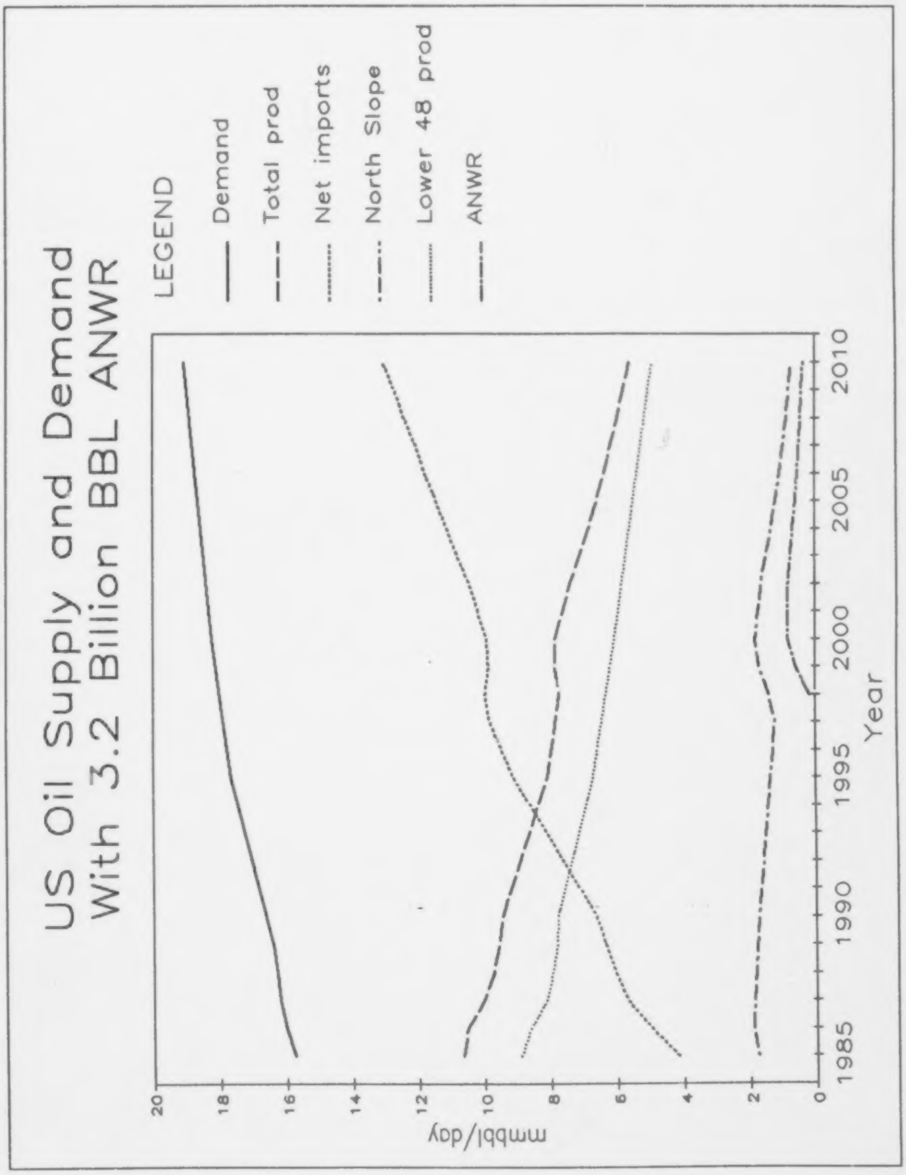
A major issue regarding the exploration and development of ANWR is its impact on the U.S. oil supply and on oil imports. The most likely scenario is that it can temporarily stem the tide of rising imports by replacing the declining production of the Prudhoe Bay and other North Slope fields.

The first chart demonstrates expectations for the U.S. oil situation without any additional North Slope discoveries. The lower 48 production includes some additional discoveries but only enough to maintain a gradual decrease in production. North Slope production also declines as these fields are depleted. Technological changes are not expected to make significant impacts on oil demand or alternative fuel supplies in this time period, thus imports increase dramatically. This poses a both a serious security problem and a balance of trade problem.

There may be some remote scenario where there are significant finds in both ANWR and the OCS, along with more conservation, that could dramatically turn this situation around. Unfortunately this is unlikely.

Discovery and production of the ANWR mean conditional estimate of 3.2 billion bbls only modifies this to a small degree. But it will delay the time when the pipeline shuts down because the flow is too low to be economical. This potential situation is not shown on the chart since it depends a great deal on oil prices. However, when it occurs the gradual decline of North Slope production will be cut off, with serious repercussions in the U.S. oil market.

Discovery of a Prudhoe size field makes a much more significant impact. When combined with an increase in TAPS capacity to 2.7 mmbbls/day, this holds imports steady for an extra 10 years. (Current TAPS capacity is 1.8 mmbbl/day, but it could be expanded to 2.7 without building a new pipeline). The TAPS capacity becomes a real limiting factor in this situation, but it has the effect of extending higher production levels further into the future. If even larger discoveries are made in ANWR, or large finds are made on the North Slope OCS, an additional pipeline may be justified. The advantages of this will depend a great deal on technology advances to develop alternative fuels at economic costs. If large OCS finds not dependent on TAPS are also made, imports may even decline to current levels, but ANWR is the key since it is the best prospect remaining in the U.S.


US Oil Supply and Demand
With 3.2 Billion BBL ANWR
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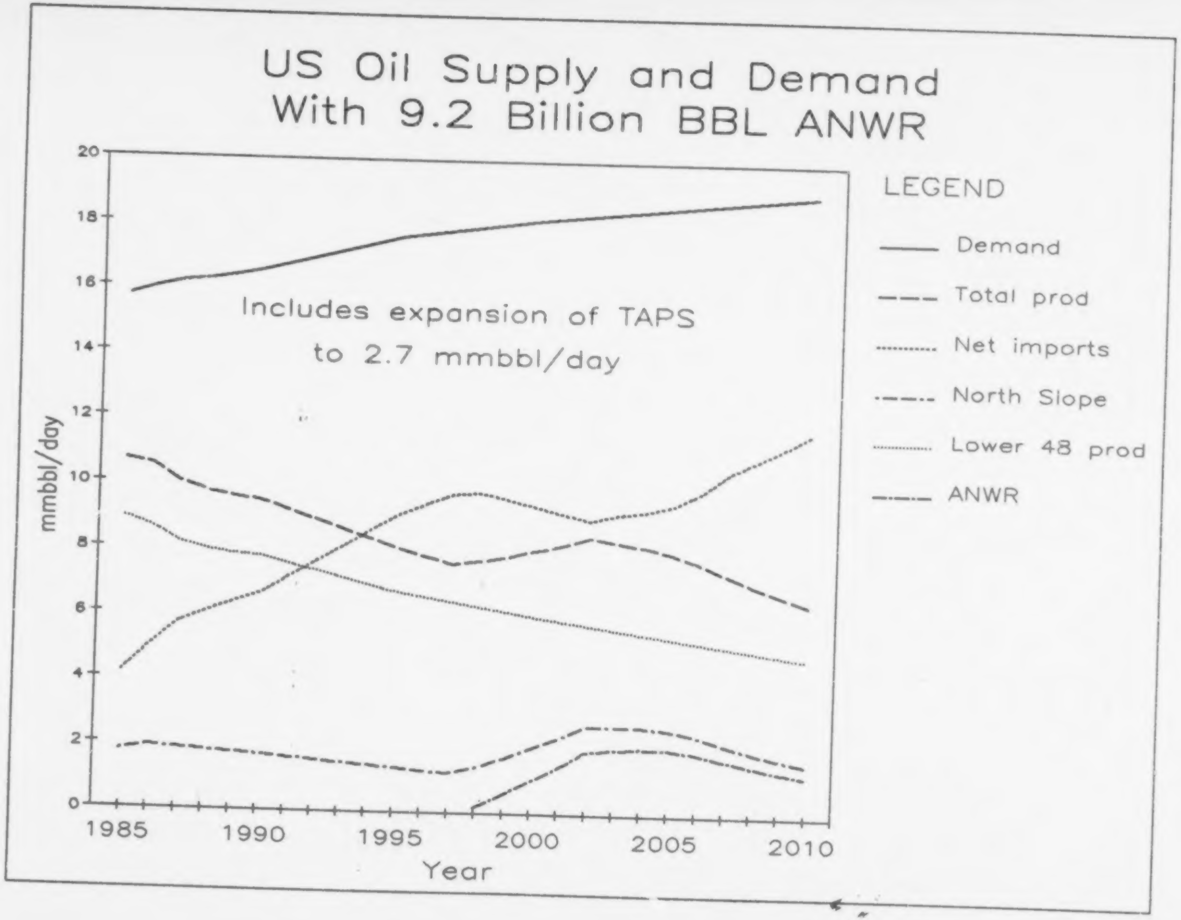
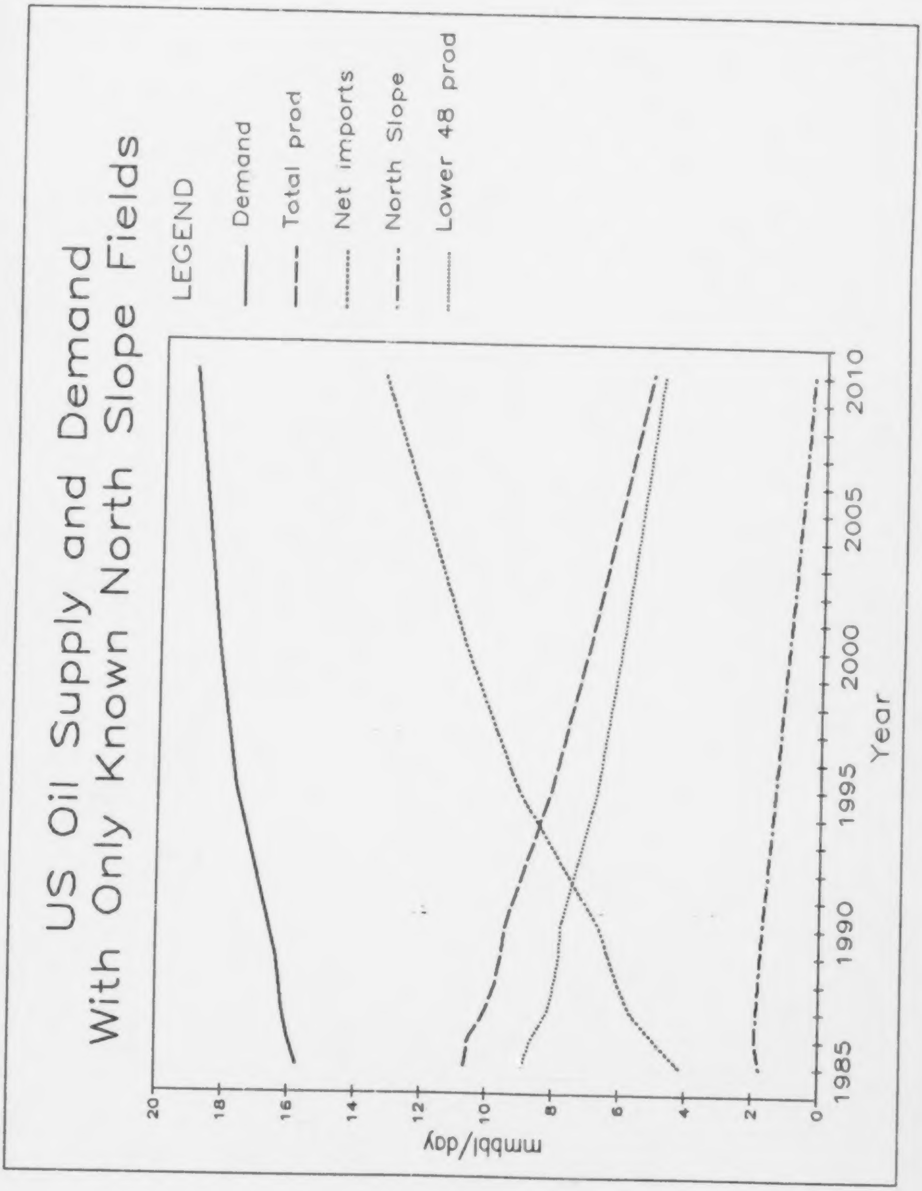


US Oil Supply and Demand With 9.2 Billion BBL ANWR

Includes expansion of TAPS to 2.7 mmbbl/day



US Oil Supply and Demand With Only Known North Slope Fields

Senator Domenici

Question 10.

What would be the net national economic benefit of oil production on the coastal plain if the concentrated calving areas were excluded from leasing?

Answer

The net national economic benefit would contribute an estimated $54 billion undiscounted, and $9.4 billion discounted (using a 10 percent real annual discount rate). The discounted value discounts, to the present, annual revenues and annual costs for the projected years of production.

Senator Domenici

Question 11.

What level of receipts would be generated for the Federal Government for oil production on the coastal plain if the concentrated calving areas were excluded from leasing?

Answer

Estimated Federal revenues would be $25.9 billion in undiscounted 1984 dollars, and $5.1 billion in discounted dollars using a 10 percent real annual rate.

Senator Domenici

Question 12.

What would be the impact on national security from oil production on the coastal plain if the concentrated calving areas were excluded from leasing?

Answer

Compared to the preferred full leasing alternative, which includes the concentrated calving areas for leasing, the favorable effects on national security would be reduced if these areas are excluded. Oil production could be approximately 25 percent less, consequently increasing U.S. needs for imported oil and adding to our dependence on foreign supplies. We would be trading secure domestic oil lines from potential ANWR production for insecure foreign supply lines which could be interrupted at any time.

Additionally, since we do not know what resources are available, restricting the area open for exploration reduces the probability that we will find sufficient oil to develop the ANWR.

13. How would the effect on the Porcupine Caribou herd under Alternative B differ from the effect on the herd under the Secretary's recommendation? (Senator Domenici)

ANSWER: The effects for Alternative B are described on pages 146-147 of the final report. Oil field development and production activities that could result in disturbance and displacement of caribou would not occur in much of the repeatedly used concentrated calving area in the Upper Jago River area under this limited leasing alternative. In addition to the reduced direct habitat loss as a result of fewer pads, roads and pipelines, the absence of human disturbance would significantly reduce behavioral avoidance and other obstacles to free movement in insect-relief, foraging, and predator-avoidance habitats, particularly by maternal cows and calves. The overall effect on the Porcupine caribou herd would be moderate under Alternative B as compared to major under Alternative A, the recommended alternative.

14. How would the effect on other wildlife under Alternative B differ from the effect on other wildlife under the Secretary's recommendation? (Senator Domenici)

ANSWER: As described on pages 146-150 of the final report, the degree of effect to other wildlife species and their habitats would be either reduced or remain the same as for Alternative A. This would occur as a result of the reduced acreage to be developed and the elimination of disturbance activities in the Upper Jago River portion of the 1002 area. For example, moderate effects expected to wolf and brown bear would be reduced to minor; minor effects expected to moose and peregrine falcon would be reduced to negligible.

15. How would the effect on other components of the biological environment under Alternative B differ from the effect on other components of the biological environment under the Secretary's recommendations? (Senator Domenici)

ANSWER: Under Alternative B, effects on other components of the biological environment (that is, the vegetation, wetlands, terrain types, and special and coastal/marine environments) would generally remain as under the Secretary's recommendation, except that there would be a reduction in the amount of direct and indirect habitat loss due to the fact that the Upper Jago River area would not be developed.

Senator Domenici

Question 16.

How would the effect on physical geography and processes of under Alternative B differ from the effect on physical geography and processes under the Secretary's recommendation?

Answer

The effect on the physical geography and processes of Alternative B (limited leasing) would be similar to those resulting from the Secretary's recommendation of full leasing, but to a lesser degree. Because there would be no exploratory drilling or development in the southeastern part of the 1002 area (Block D), there would be no access roads extending south from the main east-west road nor other support infrastructure, drill pads, exploration, or production facilities. This would result in up to a one-third reduction of the water and gravel requirements that would be needed to support full leasing, assuming, of course, that comparable development would have taken place in Block D.

17. How would the effect on the human environment under Alternative B differ from the effect on the human environment under the Secretary's recommendation? (Senator Domenici)

ANSWER: Effects of development on the human environment are expected to be similar in both scenarios. However, because a smaller portion of the 1002 area would be available for leasing under Alternative B, impacts are generally expected to be proportionally less than under full leasing. A complete discussion of the specific impacts to the human environment under Alternatives A and B is contained on pages 138-144, and page 152 of the final report.

From a national standpoint there could be a reduction in anticipated net national economic benefits of about 30 percent, and a greater dependence on foreign imports.

STEVE COWPER
GOVERNOR

STATE OF ALASKA
OFFICE OF THE GOVERNOR
WASHINGTON, D.C.

July 17, 1987

The Honorable Bennett Johnston
Chairman
Senate Committee on Energy
  and Natural Resources
364 Dirksen Senate Office Bldg.
Washington, D.C. 20510

Dear Mr. Chairman:

The purpose of this letter is to respond to questions which were posed to Governor Steve Cowper of Alaska, during or after the June 4 hearing on the Arctic National Wildlife Refuge (ANWR). This response includes: the State's definition of the core calving area; a discussion of waste management issues requested by Senator Wirth; and answers to written questions from Senator Domenici.

DEFINITION OF THE PORCUPINE CARIBOU HERD CORE (PCH) CALVING AREA

Many Arctic caribou herds exhibit a strong preference for specific calving grounds. State and other biologists believe that such a preference indicates that those areas are important to the long-term health of the herds which use them.

In 1985, the Fish and Wildlife Service (FWS) conducted a workshop to address the possible impacts of development in the 1002 area. At that time, the workshop participants identified a 242,000 acre area in which concentrated calving had occurred in a number of years between 1972 and 1985. The draft 1002 report identified this area as the "core calving" area for the PCH. However, the final report did not indicate a core area.

Because of the discrepancy between the draft and final reports, we have reexamined the data used in identifying the area. State biologists have reaffirmed that the "core" area identified at the 1985 workshop and depicted in the draft 1002 report is still the best available estimation of the calving area which is most important to the PCH. It is important to note, however, that the definition of this area is the result of professional judgment rather than statistical analysis.

HALL of the STATES — Suite 518 — 444 North Capitol Street N.W. — (202) 624-5858

WASTE MANAGEMENT ISSUES

The Alaska Department of Environmental Conservation (ADEC) is responsible for the State's environmental protection programs, including air quality, water quality, solid waste management, drinking water, oil spill prevention reporting, clean-up and disposal, and hazardous waste management. The State has full program authority for the air program (by delegation from the Federal government) and for the solid waste program. The U.S. Environmental Protection Agency (EPA) has primary authority for water quality and hazardous waste management, but the State has adopted regulations in both areas. The State also has authority to certify that National Pollution Discharge Elimination System permits issued by EPA and dredge and fill permits issued by the Corps of Engineers will meet State water quality standards. In addition, ADEC is very active in preparing stipulations for State oil and gas lease sales; reviewing designs and plans of operations for oilfield facility development; and evaluating data from a wide variety of studies, reports, sampling programs, and environmental assessments.

The Department is involved with virtually every aspect and phase of oilfield development by virtue of its broad array of programs and statutory responsibilities. These programs encompass various waste streams and entail very comprehensive and complex regulations. Compliance with these regulations may require design review; application of best available control technologies; installation of sophisticated pollution control equipment; submission of monitoring data, studies, or reports; field surveillance activities; and compliance or enforcement actions to ensure that standards or permit terms and conditions are being met.

Central services and operating practices have also evolved in concert with changed laws and regulations, identification of new problems, and improved technology. In addition, ADEC has probably exerted more "man-days" of field effort in monitoring oil and gas development on the North Slope than any other state or federal agency.

As a result of the above, ADEC is in possession of a wide variety of information pertaining to activities which have occurred on the North Slope. Examples of the type of data and information that exist include: 1) ambient air monitoring data; 2) source test performance results; 3) effluent monitoring data from state and federal wastewater discharge permits; 4) application information for all permitted air sources, wastewater discharges, and solid waste disposal facilities; 5) fuel consumption at all permitted stationary air sources; 6) logs of black smoke incidents; 7) detailed engineering plans for water and wastewater treatment works; 8) sampling plans for effluent monitoring; 9) an administrative record for each permitted facility; 10) field activity logs; 11) field notes; 12) various inspection forms geared to program type; 13) computerized information on the status of all major permits; 14) contingency plans and SPCC plans for bulk fuel storage facilities; 15) design and construction information for all permitted pads, roads, minesites, drillsites, reserve pits, storage yards, etc.; 16) computerized photograph files with prints, slides and videotapes; 17) results from special studies and monitoring programs; 18) copies of the majority of the reports and studies which have been conducted on the North Slope for programs within our jurisdiction; 19) spill report notification and individual spill files; and 20) summary reports for certain classes of activities, such as liquid waste disposal.

This listing is not all-inclusive, but serves to illustrate the variety of information available. Given the importance of this information to an evaluation of the experience gained from North Slope development, the State has begun to analyze these data so that they may be presented to the Congress in a format that facilitates objective analysis. By this fall, we will also have reviewed and will be able to comment on the assessments being prepared by other parties.

In the interim, the ADEC will attempt to respond to specific questions about any issues on matters for which it may have information or expertise.

ANSWERS TO SENATOR DOMENICI'S QUESTIONS

Resource Values of the Coastal Plain

The coastal plain of ANWR possesses many important resource values or potential values. With respect to the significance of the coastal plain as the most promising unexplored petroleum province in North America, we are enclosing the testimony of two State geologists which elaborates on this conclusion (Enclosure 1). Regarding the significance of the coastal plain as habitat for various species of wildlife, including the internationally important Porcupine Caribou Herd, we are transmitting descriptive material prepared by the Alaska Department of Fish and Game (Enclosure 2).

State Lands Closed to Oil and Gas Leasing

State law and regulations provide that unless otherwise prohibited by law, State lands are available for oil and gas leasing. Since 1978, the Alaska Department of Natural Resources has offered approximately 11 million acres for leasing. These offerings have included all of the State's known oil and gas lands with moderate to high potential, except for two small submerged land parcels adjacent to the National Petroleum Reserve-Alaska and ANWR, respectively. The latter is scheduled for leasing in June, 1988.

The State has also conducted sales in most areas which are thought to have low to very low petroleum potential. By the time we have completed our current five-year schedule, the State will have made available for exploration and development virtually all its lands believed to have petroleum potential.

The Alaska Legislature has designated about two million acres of State lands, roughly 2 percent of our land base, as special areas for wildlife and habitat protection. Oil and gas exploration and development are allowed in these areas with the exception of the Kachemak Bay Critical Habitat Area, which consists of 268,000 acres of tide and submerged lands. In another important preserve, the Bristol Bay Fisheries Reserve, oil and gas leasing may occur if the legislature determines that there will be no danger to the world class Bristol Bay salmon fishery. All critical habitats, game refuges and sanctuaries in Alaska are managed jointly by the Departments of Fish and Game and Natural Resources. These two agencies have developed a stringent slate of mitigating measures to prevent and minimize the effects of oil and gas exploration and development on these special areas.

Enclosure 1 discusses in greater detail the history of petroleum exploration and development in Alaska, the State's leasing program, and the prognosis for further major discoveries on State or Federal lands. Based on this assessment, which documents a lack of promising discoveries in spite of an aggressive leasing program, the Coastal plain is clearly the most prospective unexplored petroleum province in North America.

Recommended Environmental Safeguards

Enclosure 3 is a copy of the State's comments on the draft 1002 report. These comments outline an approach to addressing environmental issues, identify a number of areas where the 1002 report needs to be supplemented with additional information, and recommend a number of specific mitigation measures which we believe should be employed.

Conclusions Regarding the Porcupine Caribou Herd

Enclosure 4 is the Report of the Caribou Impact Analysis Workshop, Arctic National Wildlife Refuge, November 19-20, 1985. The executive summary notes "The group expected the development would produce a negative effect on coastal plain caribou populations and their distributions . . .. Greatest concern focused on displacement from traditional calving areas." Further discussion of these conclusions occurs on pages 10,11,12 and 21. The conclusion regarding displacement of the herd is included in the final 1002 report, which notes that full leasing of the 1002 area could reduce by up to 37 percent the herd's use of the core calving area.

Please contact us if you have further questions regarding these issues.

Sincerely,

John W. Katz

John W. Katz
Director of State/Federal
Relations and Special
Counsel to the Governor

Enclosures

cc: Senator Ted Stevens
Senator Frank Murkowski
Congressman Don Young
Governor Steve Cowper

TESTIMONY OF JAMES E. EASON

BEFORE THE HOUSE SUBCOMMITTEE ON WATER AND POWER RESOURCES

JUNE 23, 1987

Mr. Chairman and members of the Subcommittee, my name is James E. Eason. I am a petroleum geologist with thirteen years of experience in Alaska, and I am the Director of the Alaska Division of Oil and Gas. The Division of Oil and Gas is that agency within the Alaska Department of Natural Resources which is responsible for the competitive leasing of the state's oil and gas lands, the administration of those leases and the collection of the state's share of revenues from the leasing of its lands, and from the leasing of federal lands within Alaska and adjacent to certain of the state's offshore submerged lands.

Before turning to a discussion of the history of the development of Alaska's oil and gas resources, and describing current production within the state, I would like to stress two very important points. First, I believe oil and gas leasing and development in Alaska is extremely important to both the state and the nation, and second, I am convinced that the coastal plain (or 1002 area) of the Arctic National Wildlife Refuge (ANWR) is the most prospective unexplored petroleum province remaining in North America.

As a result of the field work and geophysical surveys conducted over the past twenty years, it has been clearly demonstrated by federal, state and independent investigators that the 1002 area could yield Prudhoe Bay-size quantities of petroleum. To put this conclusion in proper perspective, the Prudhoe Bay field on Alaska's North Slope, is the largest oil field in North America, with original reserves of nearly 10 billion barrels of recoverable oil. Production from the Prudhoe Bay field and the adjacent Kuparuk River field currently accounts for over 20% of the total daily domestic crude production.

Situated on trend between the prolific North Slope oil fields to the west and the petroleum-rich Canadian Mackenzie Delta province to the east, the 1002 area has all of the key geologic elements requisite for major hydrocarbon accumulations. Based on field observations of oil seeps and oil-stained reservoir rocks at surface outcrops, it is evident that oil has been generated by source rocks in the area. Hopefully, most of that oil has migrated into and been trapped within reservoir rocks in the very large structures which lie beneath the surface. The quality of source and reservoir rocks found in ANWR represent the best of both Prudhoe Bay and Mackenzie Delta. In addition, based upon the limited geophysical data collected to date, twenty-six large prospective traps have been identified beneath the surface of the 1002 area. It is estimated that if oil is contained within these structures beneath the 1002 area, there is a five percent probability of there being between 26.5 and 29.4 billion barrels of oil in-place. This volume compares favorably with the 23.5 billion barrels of oil initially in-place at Prudhoe Bay. For additional perspective, it is interesting to note that prior to drilling, some industry officials estimated that there was only a two percent probability that the Prudhoe Bay area contained as much as two billion barrels of oil.

Exploring for oil and gas in frontier areas such as the coastal plain of ANWR is an extremely risky enterprise. The worldwide success ratio for exploratory wells in frontier areas is about one success in twenty, or 5%. In ANWR, the odds are estimated to be much better. The federal government estimates there is a twenty percent chance that economically recoverable oil is present in the 1002 area. This is an exceptionally high number for such a small area.

In our opinion, exploration to confirm ANWR's petroleum potential is clearly in the interest of the state and the nation. We in Alaska have just recently witnessed the production of the five billionth barrel of oil from Prudhoe Bay. This means that one-half of the total proven 10 billion barrels of recoverable oil have been transported through the Trans-Alaska Pipeline System (TAPS) in just ten short years. It also means that the largest field in North America, which currently contributes a major share of this country's daily production, will begin a precipitous and irreversible production decline in the near future (mid 1988).

Presently, North Slope crude flows through TAPS at a rate of about 685 million barrels per year. By the year 2000, even projecting the contributions of other known North Slope fields expected to come on line, annual production from Alaska will fall to approximately 386 million barrels per year. This volume represents only about 55% of the pipeline's capacity.

If the coastal plain of ANWR is opened to exploration and if petroleum is discovered in significant quantities, production from this region could help to offset the expected decline in

North Slope production. Most experts believe that by the year 2000 domestic oil production will be substantially less than the current 8.3 million barrels per day--it likely will be between 4.5 million and 6.4 million barrels per day. ANWR could contribute at least 700,000 barrels per day to the year 2000 totals, and 1.5 million barrels per day for the following ten years before its production decline begins. This increased production would be at the expense of imported oil, thereby contributing positively to our nation's balance of payments and its energy security.

It is clear to the state of Alaska that the high prospectivity of the coastal plain of ANWR, and its potential to supplement the projected domestic production decline, thereby reducing our oil imports, justifies an early and thorough assessment of the area by exploratory drilling. I believe a review of the history of oil and gas exploration and development in Alaska will underscore the importance and wisdom of proceeding with an orderly exploration program now rather than later.

Opening the 1002 area for drilling would be adding a crucial --and perhaps final--chapter to Alaska's long history of involvement in petroleum exploration and development. This involvement began around the turn of the century when early explorers and whaling crews reported occurrences of natural petroleum seeps along coastal regions of the state. Those discoveries were the harbingers of the exploration successes of the 1960's and 1970's which were to confirm the presence of massive oil and gas reserves along the North Slope of Alaska. It was the perseverance of the early explorationists--often in the face of staggering failures, which led to the discoveries of Prudhoe Bay and Kuparuk River, respectively North America's first and second largest producing oil fields.

The sheer magnitude of those North Slope discoveries tends to overshadow many important successes--and failures--elsewhere in Alaska during the intervening years. I believe it is important to review some of these other oil and gas milestones, because I think they will underscore the importance of exploring and confirming ANWR's potential without delay.

The state's earliest commercial petroleum development was of a much more modest scale than most North Slope development, and was located hundreds of miles south of Prudhoe Bay near the village of Yakutat along the Gulf of Alaska. Here, in 1902 the Katalla Oil Field was discovered. Before Katalla was abandoned in 1933 due to a fire at the production facilities, this field produced 154,000 barrels of oil. In thirty-one years Katalla produced less oil than is currently transported through TAPS every two hours!

The next major milestone in oil and gas development within Alaska came with the 1957 discovery of oil at the Swanson River Field by Richfield Oil Corporation and its partners. That onshore discovery on the Kenai Peninsula adjacent to Cook Inlet led quickly to the leasing, exploration and development of numerous onshore and offshore tracts within the Cook Inlet Basin. Since that first discovery at Swanson River, a total of 21 oil and gas fields have been discovered in Alaska's Cook Inlet.

Although the State of Alaska's competitive lease sales in the Cook Inlet Basin continue to draw moderate attention, most knowledgeable explorationists believe that Cook Inlet development has seen its zenith. Cumulative production from the area through 1986 was 1.073 billion barrels of oil and 4.9 trillion cubic feet of natural gas. The average annual decline in oil production is approximately 15 percent, and current total Cook Inlet production is about 46,000 barrels per day. Again for perspective, the combined daily oil production from all Cook Inlet fields amounts to slightly more than the volume moved through TAPS every thirty minutes.

Industry interest and the mapping of numerous extremely large subsurface structures in the Gulf of Alaska led the U.S. Department of the Interior, in 1976, to conduct its first competitive oil and gas lease sale in Alaskan waters, OCS Sale 39. Because of prior production onshore in the nearby Katalla area, the Gulf of Alaska then was considered to be highly prospective. Three federal OCS lease sales in the Gulf of Alaska generated total bonus bids of $670 million dollars for leases located there. However, exploration of those leases resulted in a succession of 12 very expensive dry holes.

The failure of the Gulf of Alaska to meet everyone's expectations serves to emphasize that, even in Alaska, and even next door to confirmed production, there is no certainty of success when it comes to oil and gas exploration. As a matter of fact, this unfortunate pattern--the subsequent condemnation of otherwise extremely prospective federal OCS acreage adjacent to previous discoveries--has since been repeated all too often in Alaska.

Like the Gulf of Alaska, the early successes in the Cook Inlet Basin did not assure similar successes on adjacent federal OCS tracts. In 1977 the first of three federal OCS sales in the Lower Cook Inlet was held. These sales netted the federal government $403 million in bonus bids, but resulted again in 12 dry holes. In fact, results were so discouraging that the final Lower Cook Inlet OCS sale, which was held in 1982, received no bids.

I would like to focus now, for a few minutes, on the history of exploration on Alaska's North Slope. In 1919, a geologist with the U.S. Geological Survey, Ernest de K. Leffingwell, traversed the area on foot and with dog teams, recording the first formal descriptions of North Slope geology and documenting the locations of several oil seeps. After Leffingwell, other expeditions led by geologists of the U.S.G.S. followed. These survey teams mapped and documented the surface exposures of many potential petroleum deposits in Northern Alaska.

Based in large measure upon the results of these early surveys, in 1923, the Naval Petroleum Reserve No. 4 (now National Petroleum Reserve-Alaska) was established. The first exploration phase of NPR-4 ended in 1953; in the intervening years between 1923 and 1953 the United States Navy had drilled 37 test wells and found three oil accumulations and six gas accumulations within the Reserve. Only two of these discoveries were considered sizeable, namely Umiat, with 30 to 100 million barrels of oil and Gubik, with 370 to 900 billion cubic feet of gas. Gas from another of the discoveries, the small South Barrow gas field, is being produced today for local consumption at Barrow. The Navy's 30-year exploration effort in NPRA cost the federal government between $50 and $60 million.

In 1960, the Arctic National Wildlife Range (ANWR) was established. The closure of this area, extending eastward from the Canning River to the Canadian border, combined with prohibitions against competitive leasing in NPRA to the west, effectively confined industry exploration efforts to the area between the Colville and Canning Rivers. In 1964, the State of Alaska selected about 80 townships in this corridor between NPRA and ANWR, and in December of that year, the state held its first competitive North Slope lease sale, and exploration of the resulting leases began shortly thereafter.

Following a succession of seven dry holes in the arctic foothills to the south, exploration shifted northward to the central coastal plain. In 1965, the first dry holes in the area immediately surrounding the Prudhoe Bay structure were drilled. In January, 1967, in what was essentially a last ditch effort, a rig was moved to the Prudhoe Bay State No. 1 location. Twelve months later, in January, 1968 the discovery of the Prudhoe Bay oil field was announced.

Thirty-three exploratory wells were drilled the following year, and in September, the state held its 23rd Competitive Lease Sale which consisted of acreage near and adjacent to the Prudhoe Bay discoveries. That sale attracted over $900 million in bonus bids. This was the last lease sale on the North Slope until the Joint Federal-State sale in December, 1979. After the discovery of the Prudhoe Bay field and before the 1979 joint sale, over 100 exploratory wells were drilled on the North Slope, with 19 of those wells discovering oil or gas.

In 1974, exploration began again in NPRA, this time under the direction of the U.S. Geological Survey. Between 1974 and 1981 twenty-seven exploratory wells were drilled within NPRA at a cost to the federal government just over a half billion dollars. After the federal exploration program ended, Congress authorized competitive leasing in NPRA, and three sales were held. The first two of these sales received minimal interest, and the third received no bids. Only one additional exploratory well has been drilled on the leases acquired in those sales, and it was another dry hole.

Including the 1979 Joint Sale, three federal lease sales have been held in the Beaufort Sea. These three sales produced total winning bonus bids of $3.4 billion. Eighteen exploratory wells have been drilled offshore in the OCS area extending eastward from NPRA to ANWR. The results have included five announced discoveries near the Prudhoe Bay field, one each near Seal and Sandpiper Islands, two near Tern Island and one near Duck Island (Endicott). Also, a very recent discovery by Unocal at its Hammerhead #1 well is located about 10 miles offshore of Flaxman Island.

Since 1979, the state has conducted ten competitive lease sales, offering over 3.7 million acres of onshore North Slope and submerged Beaufort Sea acreage. Total bonuses received for these leases were more than $700 million. To date, these leases have produced only two discoveries, one oil discovery at Colville Delta by Texaco and its partners, and another by Shell Oil, et al at Seal Island. The Seal Island discovery straddles both state and federal acreage. These are the only successes on state acreage since 1979 contrasted to a long list of exploratory failures drilled to test the area.

Although new discoveries have been scarce, the post-Prudhoe Bay exploration activity has resulted in better delineation of several significant hydrocarbon deposits, both onshore and in the Beaufort Sea. These include the discoveries at Point Thomson, Kuparuk River, Milne Point, Gwydyr Bay, Endicott, Mikkelsen, Seal Island, Sandpiper Island, West Sak, Colville Delta, Tern Island, Lisburne and other areas.

The Kuparuk River reservoir was discovered in 1969, and production commenced from the Kuparuk River Unit in 1981. It is estimated that this reservoir west of Prudhoe Bay contains 1.5 billion barrels of recoverable oil. Production from the reservoir has been much better than expected, and is currently at 290,000 barrels per day.

ARCO Alaska has applied for approval of a pilot enhanced recovery project (Miscible Gas Injection) in an effort to boost ultimate recovery from the reservoir. A major waterflood program is already underway.

Although the Lisburne Oil Pool was discovered just days after the Prudhoe Bay Sadlerochit Oil Pool, production did not commence from this deeper reservoir until December, 1986. It is estimated that the Lisburne reservoir contains 3 billion barrels of oil in-place, with about 400 million barrels being recoverable. Production is currently about 40,000 barrels per day, and is expected to peak at about 100,000 barrels per day. Ultimate recovery from the reservoir will increase if a pilot waterflood project now underway proves to be successful, and if permits for an offshore drill site are ultimately approved. The Kuparuk River and Lisburne fields no doubt benefited from the infrastructure already in place at Prudhoe Bay.

The nearby Milne Point field, with estimated reserves of about 60 million barrels of recoverable oil, was brought on line in 1985 only by virtue of its close proximity to the infrastructure that resulted from the Prudhoe Bay-Kuparuk River development. Milne Point was subsequently shut-in January, 1987 due to the low price of oil.

The Endicott accumulation, discovered in 1978 and operated by Standard Alaska Production (BP), is located approximately 30 miles east of Prudhoe Bay. It has estimated recoverable reserves of about 375 million barrels. Production from Endicott is expected to commence in late 1987 or early 1988, and peak at approximately 100,000 barrels per day in 1989, marking the first ever commercial production from offshore acreage in the Beaufort Sea. The production rate can probably be maintained for about five years, at which time a 15% per year production decline will begin. Endicott is located two miles offshore in eight to ten feet of water, and is connected to land by a gravel causeway. In relative terms, Endicott is the most costly North Slope field to be developed to date.

The Point Thomson field, which lies east of Endicott and just west across the Canning River from ANWR, was discovered in 1977 by Exxon and its partners. Point Thomson is estimated to contain about 350 million barrels of recoverable condensate (light gravity crude) and 5 trillion cubic feet of gas. Development of this field is problematical under the current economic conditions and in light of the 60 mile distance from the Trans-Alaska Pipeline and other production infrastructure. If discoveries are made to the east of Point Thomson in ANWR or on nearby state or federal offshore acreage, the outlook for early development of this field would improve substantially.

In 1983, Shell Oil drilled a successful exploratory well at Tern Island, about 20 miles east of Prudhoe Bay field. A third well in this area has just been completed, but estimated recoverable reserves have not yet been published.

The Seal Island discovery, which lies offshore from the Prudhoe Bay Field, was made in 1984 by Shell, Amerada Hess and partners. It is located about eight miles offshore in 40 feet of water, approximately 20 miles from Pump Station 1. Reserves at Seal Island are estimated to be similar to those in Endicott, somewhere in the 300 million barrel range. The reservoir appears to straddle the state/federal Beaufort Sea boundary. The distance from shore and water depth will make this a very expensive prospect to develop. Higher oil prices and the expectation of continued higher prices will be required to initiate development and production from this discovery.

In 1986 Shell, Amoco and partners announced another discovery offshore northwest of Prudhoe Bay field at Sandpiper Island. Sandpiper is about eleven miles northwest of the Seal Island discovery. Estimated recoverable reserves have not, as yet, been published for Sandpiper. It is likely, however, that the development of Sandpiper will be linked to that of the adjacent Seal Island discovery.

Included within the boundaries of the Kuparuk River oil field is a very large oil accumulation known as the West Sak reservoir. The West Sak is estimated to contain at least 20 billion barrels of oil in place. Those massive reserves lie literally right in the center of the second largest producing oil field in North America. Unfortunately, the oil within the West Sak reservoir is only 3000 feet to 4000 feet below the surface, and only 1000 feet to 2000 feet below the bottom of the overlying permafrost layer. Consequently the oil is cool (70 to 90 degrees Fahrenheit), and it has a low gravity of 10 degrees to 20 degrees API. The combination of these factors precludes the heavy oil from flowing into the wellbores very rapidly.

Compared to a good Prudhoe Bay well which produces over 5000 barrels per day, an excellent West Sak well might produce only 500 barrels per day. The shallow reservoir depth also means that there is very little gas dissolved in the heavy oil, and therefore, minimal pressure to drive the oil into the wellbores. The shallow depth adds another negative factor, in that fewer wells can be drilled directionally (due to steep drilling angles) from each individual drilling pad. These factors will add considerable development expense to the West Sak project.

Poor oil quality, low flow rates and added development expense have all combined to keep the West Sak from being developed at today's oil prices, even though it lies within the boundaries of the Kuparuk River field and is only twenty miles or so from Pump Station 1 of TAPS. Even though the volume of oil in place is staggering by any standards, the West Sak awaits higher oil prices and additional technological advances to make its development possible.

Oil prices in the mid $20 per barrel range would go a long way toward making the West Sak commercial. However, even if and when the West Sak does come on line, the total daily field rate will be relatively insignificant in comparison with current rates from Prudhoe Bay and Kuparuk River because of the low individual well rates. If the West Sak development does not piggy back onto the existing Kuparuk development, it may never come on line.

Having described the chronology and briefly highlighted some of Alaska's most promising discoveries, as well as its exploration failures, I would like to summarize what I believe these data are telling us regarding Alaska's and the Nation's future production capabilities. The state's only commercial production to date, with the exception of the minor production from the Katalla field, has come from either the Cook Inlet or the North Slope. The Cook Inlet production is now in a state of decline, and the basin itself is in a mature or advanced state of exploration--large additions to the known reserves are unlikely.

The current production from Prudhoe Bay field far surpasses the combined production from all other North Slope and Cook Inlet fields. The new North Slope discoveries announced over the last few years, although encouraging, will have little effect in delaying the precipitous Prudhoe production decline that will begin in the near future. As I have previously mentioned, by the year 2000, we project total Alaska production to be only 386 million barrels of oil per year.

The stark reality is that the list of past exploration failures in Alaska on both federal and state lands has grown quite long since the monumental discovery at Prudhoe Bay. The list of failures includes the Gulf of Alaska, Lower Cook Inlet, several interior basins, the Alaska Peninsula, NPRA, and large portions of the western and central North Slope, both onshore and offshore. In the past two years, there has been a succession of dry holes drilled in the once promising OCS frontier basins offshore of western Alaska, including the St. George, Navarin, and Norton Basins.

Since the discovery of oil in Cook Inlet in 1957, 65 exploratory wells have been drilled on federal OCS leases while several hundred more have been drilled on state leases in Alaska. These wells were drilled at a substantial cost to the oil and gas industry. While the total costs are not readily determinable, the leases alone cost over $7.5 billion, and in the vast majority of cases, wells drilled to test these leases were disappointing. Because of the disappointing results elsewhere in Alaska, exploration now has shifted to the eastern North Slope and Beaufort Sea. But, historically, even in these prime prospecting areas, failures far surpass successes. Perhaps one of the most famous examples is the much-touted Mukluk prospect in the

Beaufort Sea west of Prudhoe Bay. Leases overlying that prospect drew about $1.4 billion in competitive industry bids in 1982, and the first well there cost an additional $150 million to drill. As we all know now, Mukluk turned out to be another major disappointment.

These failures serve to emphasize two very important points. First, we cannot simply assume that ANWR holds oil and gas reserves which can be banked for future development. Our pre-drilling estimates of resources there may in fact be seriously in error, as they were at NPRA and Mukluk. Both national security and economic efficiency argue strongly for expeditious confirmation of ANWR's potential. Secondly, there are no areas left in this country with the potential, such as ANWR, to substantially and positively affect our nation's overall balance of trade and national security.

The discoveries at Seal Island in the Beaufort Sea and the huge West Sak heavy oil deposits west of Prudhoe Bay may help to supplement future North Slope production volumes, but only if oil prices climb and stabilize above $20 per barrel (in 1987 dollars). Unfortunately, however, unless a new multi-billion barrel discovery is made on the North Slope, annual throughput in TAPS will decline significantly beyond 1995 regardless of what the oil price may be at that time.

There are obviously many direct benefits that would follow if ANWR is opened to exploration and if oil is found in commercial quantities and developed. However, I would like to direct your attention to some of the secondary, indirect benefits that I believe would follow as a result of construction of an oil pipeline from ANWR discoveries westward to TAPS Pump Station #1. First, total projected TAPS throughput would increase significantly, and tariffs for all oil transported through TAPS would decrease, resulting in a net higher wellhead value for the oil. This means that existing fields like Prudhoe Bay and Kuparuk River could produce longer, and discoveries such as West Sak and Seal Island may become economic to develop.

Secondly, exploration for new fields would increase since expected revenues from any new discoveries would be higher if pipeline tariffs are lower. Onshore state, federal and native lands, and offshore state and federal tracts would benefit from the increased pace of exploration. Future discoveries in the deeper waters of the Beaufort Sea, where development will be extremely expensive, will have a greater likelihood of being explored, developed and produced.

In addition, existing discoveries located between Pump Station #1 and ANWR would be developed sooner since a major part of the required infrastructure, that is the pipeline, would be in place. For example, Point Thomson field, which is immediately adjacent to ANWR and contains about 350 million barrels of recoverable oil, could probably support development with some incremental help from ANWR discoveries. The catalytic effect of new discoveries in ANWR on extending the field life of producing North Slope fields and in encouraging new exploration and development elsewhere along the Arctic coast of Alaska cannot be overemphasized. There truly is no better place and no better time to explore for the oil reserves that will be critical to this country's energy future.

Mr. Chairman and members of the Subcommittee, this concludes my written testimony. I greatly appreciate the opportunity to provide this subcommittee some information on oil and gas production in Alaska and the history of that development. I also appreciate the opportunity you have provided me to explain why I believe it is crucial that the coastal plain of ANWR be opened for competitive leasing without delay. I will be happy to answer any questions you may have.

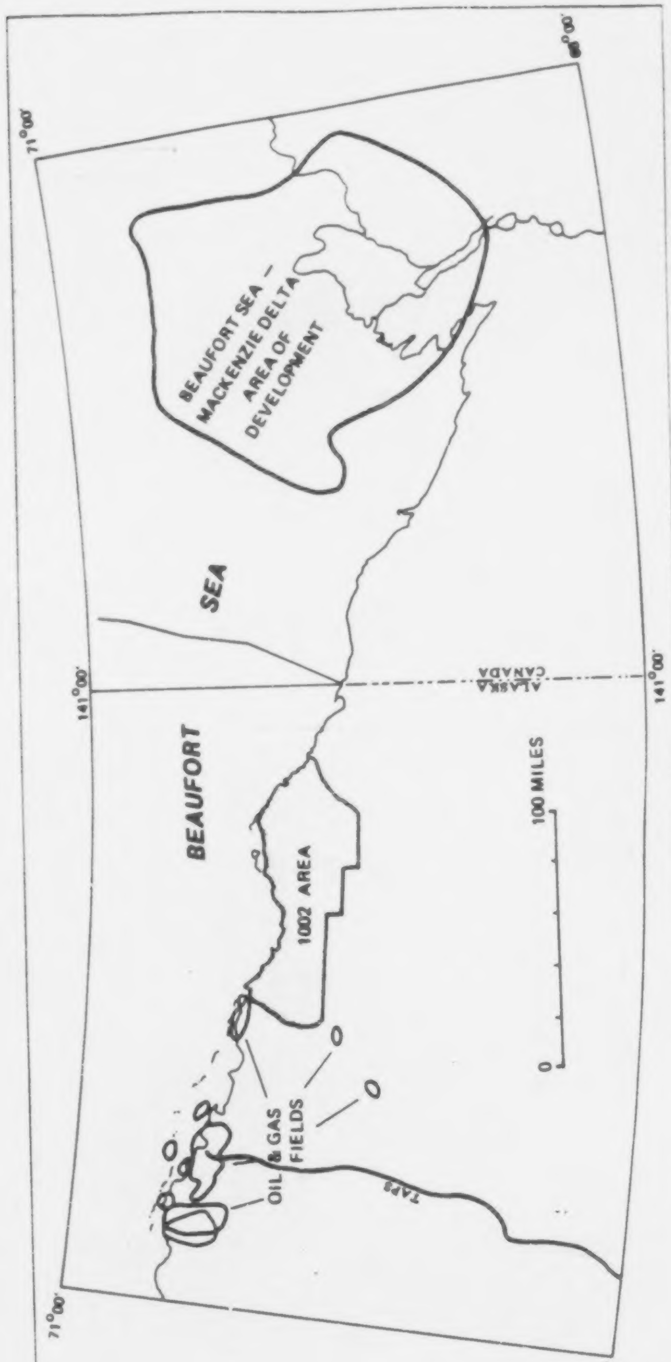

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Figure 1. 1002 Area Location Map.

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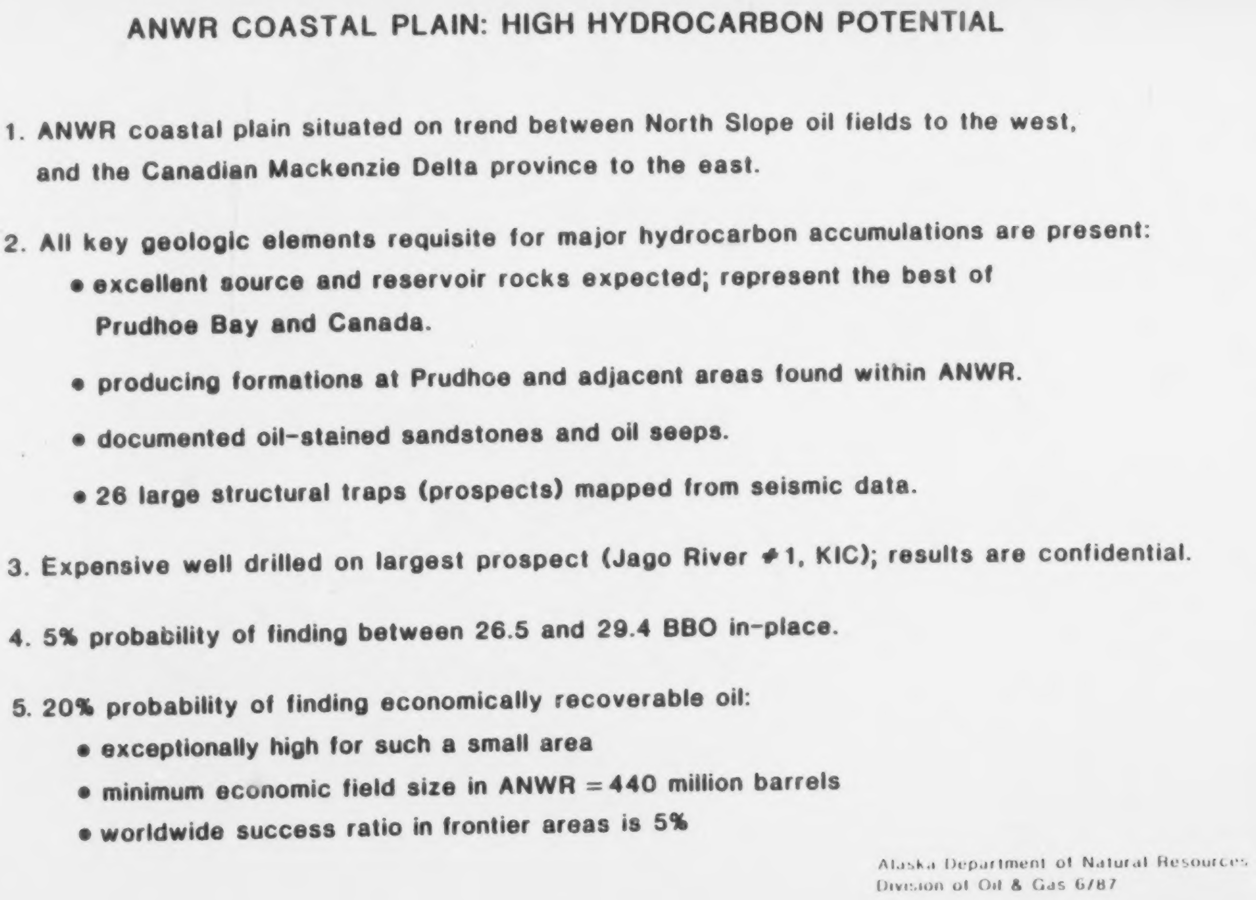

ANWR COASTAL PLAIN: HIGH HYDROCARBON POTENTIAL

1. ANWR coastal plain situated on trend between North Slope oil fields to the west, and the Canadian Mackenzie Delta province to the east.

2. All key geologic elements requisite for major hydrocarbon accumulations are present:
    - excellent source and reservoir rocks expected; represent the best of Prudhoe Bay and Canada.
    - producing formations at Prudhoe and adjacent areas found within ANWR.
    - documented oil-stained sandstones and oil seeps.
    - 26 large structural traps (prospects) mapped from seismic data.

3. Expensive well drilled on largest prospect (Jago River #1, KIC); results are confidential.

4. 5% probability of finding between 26.5 and 29.4 BBO in-place.

5. 20% probability of finding economically recoverable oil:
    - exceptionally high for such a small area
    - minimum economic field size in ANWR = 440 million barrels
    - worldwide success ratio in frontier areas is 5%

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Figure 2. ANWR Hydrocarbon Potential Summary.

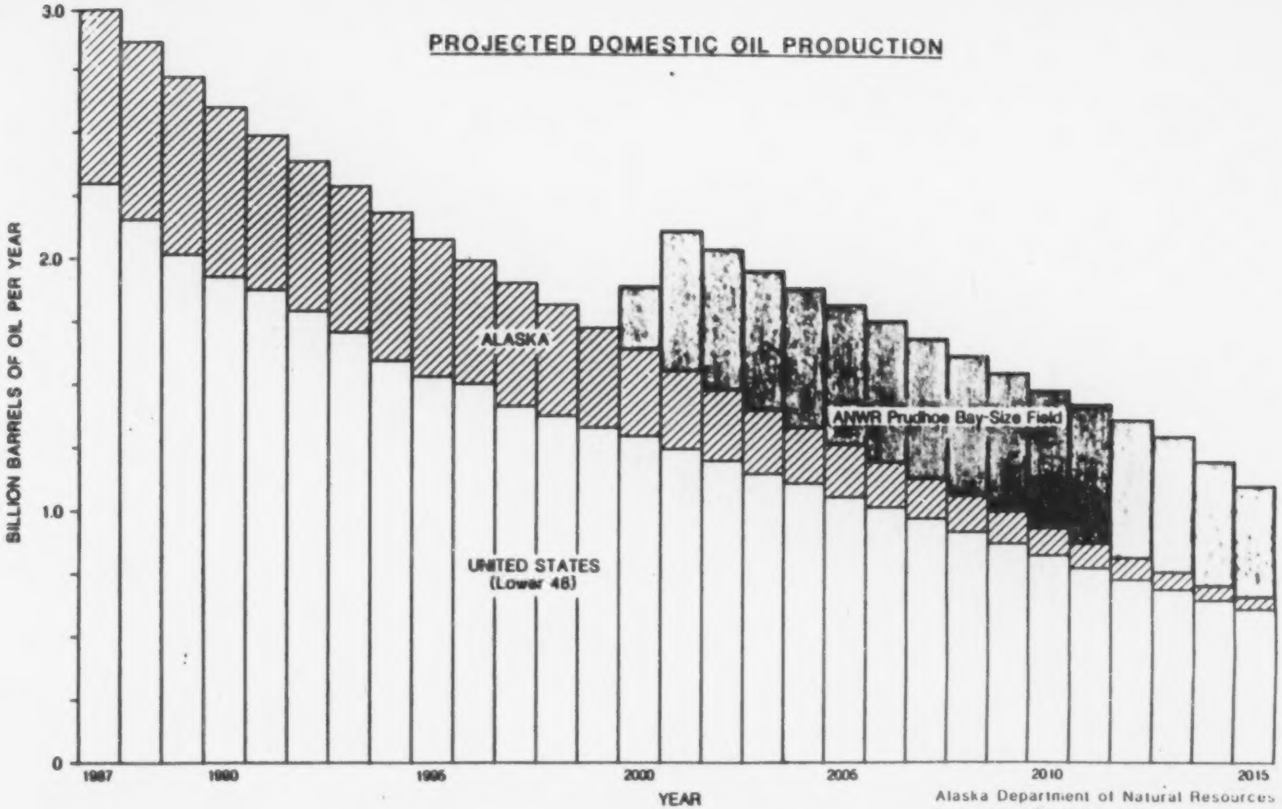

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Figure 3. Projected Domestic Oil Production.

PROJECTED U.S. IMPORTED OIL

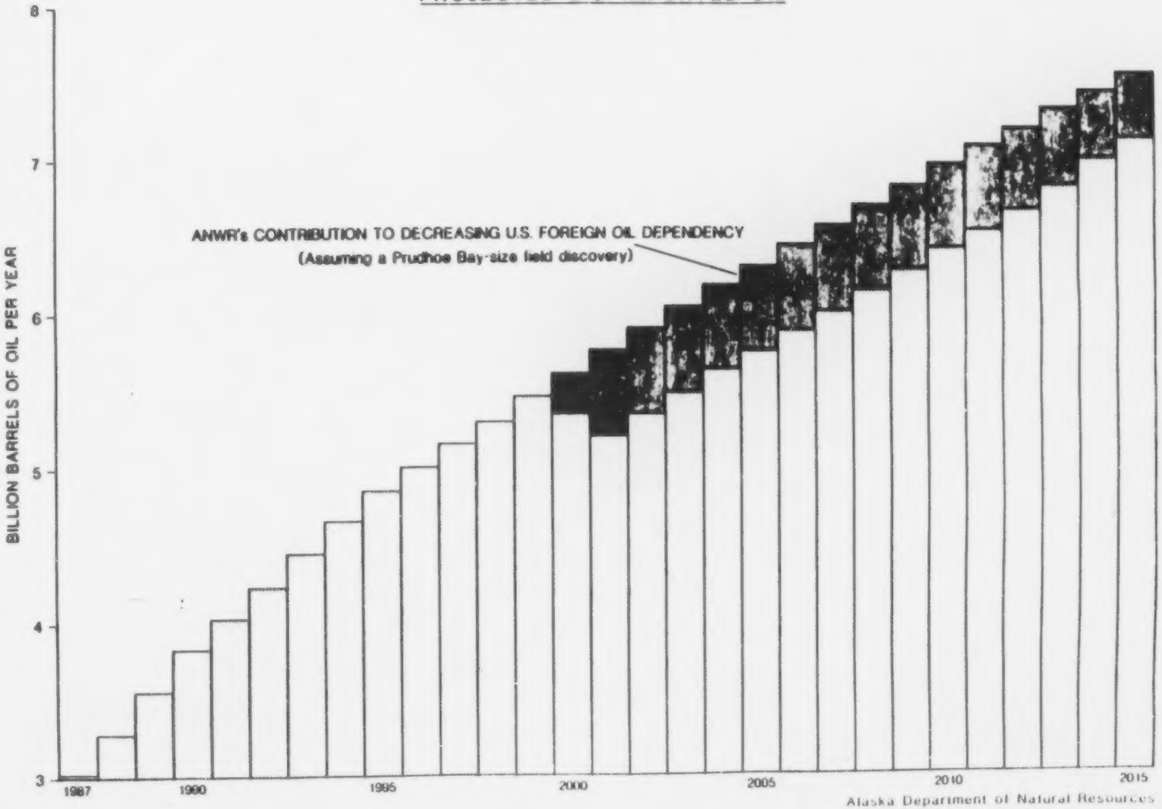

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Figure 4. Projected U.S. Imported Oil.

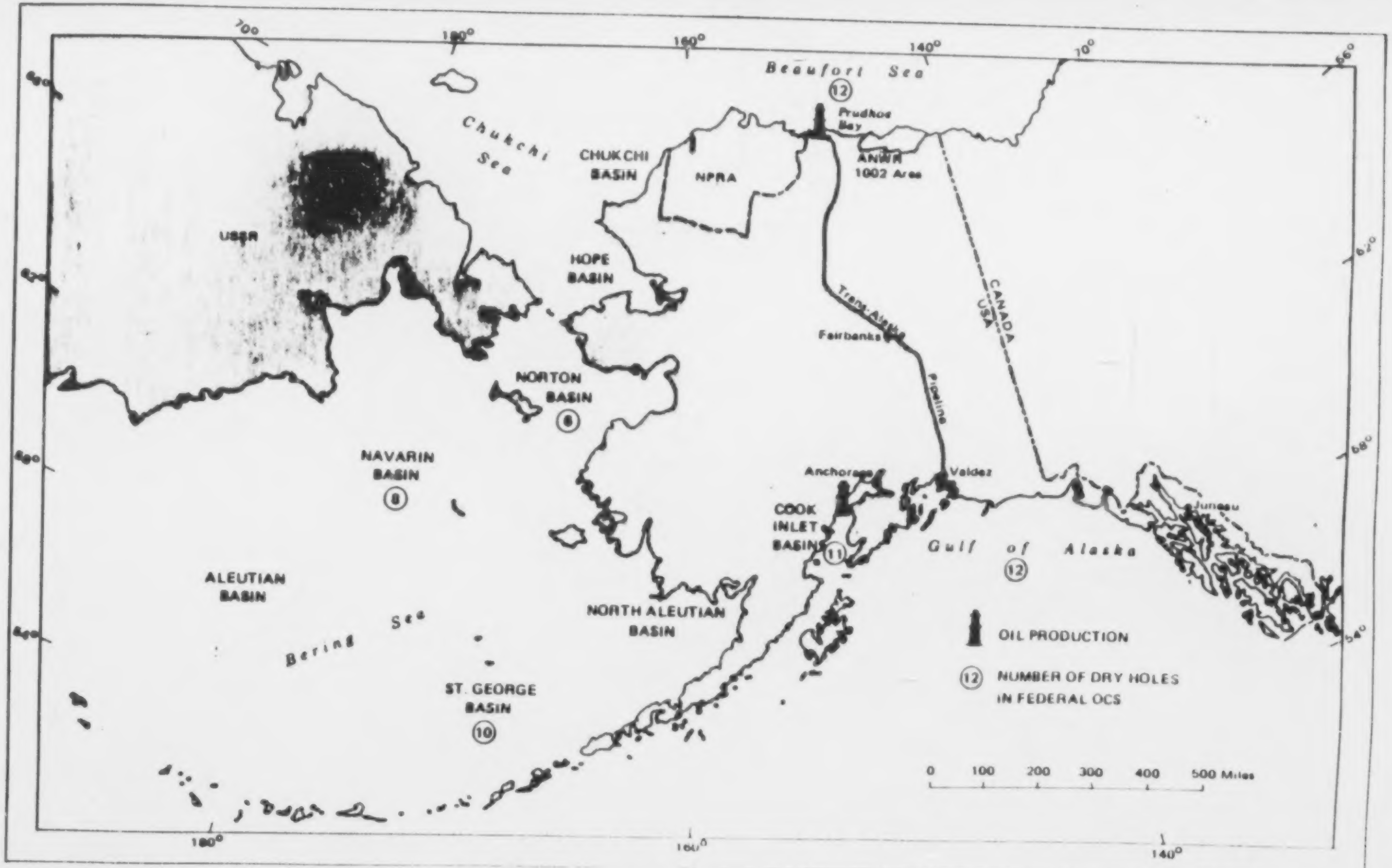
Beaufort Sea
12
Prudhoe Bay
ANWR 1002 Area
Chukchi Sea
CHUKCHI BASIN
NPRA
USSR
HOPE BASIN
Trans-Alaska Pipeline
Fairbanks
CANADA
USA
NORTON BASIN
6
NAVARIN BASIN
8
Anchorage
Valdez
Juneau
COOK INLET BASIN
11
Gulf of Alaska
12
ALEUTIAN BASIN
Bering Sea
NORTH ALEUTIAN BASIN
ST. GEORGE BASIN
10
OIL PRODUCTION
12 NUMBER OF DRY HOLES IN FEDERAL OCS
0
100
200
300
400
500 Miles
70°
180°
160°
140°
70°
66°
62°
58°
54°
180°
160°
140°

Figure 5 Number of exploratory dry holes in Federal OCS

Alaska Department of Natural Resource
Division of Oil & Gas 6/87

Cook Inlet/Gulf of Alaska Oil and Gas Fields

As of January 1, 1987

Field Name	Discovery Date	Company	Estimated Original Recoverable Reserves	Production Start-up Date	Cumulative Production	Remaining Reserves
Swanson River	7/57	Richfield Oil Corp	259 BCF 217 MMBO	7/60	Gas reinjected 205 MMBO	259 BCF 12 MMBO
N Cook Inlet	8/62	Pan American Petro	1594 BCF	2/69	777 BCF	817 BCF
Granite Point	6/65	Mobil Oil	105 BCF 126 MMBO	2/67	90 BCF 104 MMBO	15 BCF 22 MMBO
Trading Bay	6/65	Union Oil	63+ BCF 90 MMBO	1/67	63 BCF 88 MMBO	** 2MMBO
McArthur River	10/65	Union Oil	965 BCF 574 MMBO	9/67	315 BCF 523 MMBO	650 BCF 51 MMBO
Middle Ground Shoal	8/62	Pan American Petro	86 BCF 162 MMBO	12/65	78 BCF 150 MMBO	8 BCF 12 MMBO
Beluga River	12/62	Standard Oil of Cal	1003 BCF	1/67	229 BCF	774 BCF
Cannery Loop	6/79	Union Oil	300 BCF	(11/87)	0	300 BCF
Falls Creek	6/61	Standard Oil of Cal	54 BCF	Shut-in	0	54 BCF
Nicolai Creek	5/66	Texaco				
North Fork	12/65	Standard Oil of Cal				
West Foreland	3/62	Pan American Petro				
West Fork	9/60	Halbouty Alaska				
Sterling	8/61	Union Oil	25 1 BCF	1/68 Shut-in	2 1 BCF	23 BCF
Birch Hill	2/67	Standard Oil of Cal	11 BCF	Shut-in	0	11 BCF
Beaver Creek	6/65	Marathon Oil	241 5 BCF 4 MMBO	10/82	47 5 BCF 3 MMBO	194 BCF 1 MMBO
Ivan River	10/66	Standard Oil of Cal	504 BCF	Shut-in	0	500 BCF
Lewis River	9/75	Cities Service		9/84	4 BCF	
Moquawkie	11/65	Socony Mobil Oil		Shut-in		
Pretty Creek	2/79	Halbouty Alaska		12/86		
Stump Lake	5/78	Chevron USA		Shut-in	0	
Kenai	10/59	Union Oil	2496 BCF	8/61	1740 BCF	756 BCF
Totals			7606 6+ BCF 1173 MMBO		† 3345 6 BCF 1073 MMBO	4361 BCF 100 MMBO
Gulf of Alaska						
Katalla	1902	Alaska Development Co	?	1912 Shut-in 1933	154 000 BO	?

*BCF – Billion Cubic Feet of Gas
MMBO – Million Barrels of Oil

** Included in McArthur River Remaining Reserves
† Does not include reinjected gas

Alaska Department of Natural Resources
Division of Oil and Gas 6/87

Figure 6. Cook Inlet/Gulf of Alaska Oil and Gas Fields.

North Slope Oil and Gas Fields

As of January 1, 1987

Field Name	Discovery Date	Company	Estimated Original Recoverable Reserves	Production Start-up Date	Cumulative Production	Remaining Reserves
Prudhoe Bay	12/67	Richfield Oil Corp.	28,500 BCF 9590 MMBO	10/69 (Tests) 7/77(Pipeline)	6423 BCF ** 4918 MMBO	25,816 BCF 4672 MMBO
Kuparuk River	4/69	Richfield Oil Corp.	640 BCF 1600 MMBO	12/81	345 BCF ** 292 MMBO	566 BCF 1308 MMBO
Prudhoe Bay (Lisburne Pool)	12/67	Richfield Oil Corp.	≈ 635 BCF 400 MMBO	11/83 (Tests) 3/85	11.4 BCF ** 5.3 MMBO	624 BCF 395 MMBO
Milne Point	10/69	Socal	? ≈ 60 MMBO	5/85-1/87 Shut-in	1.9 BCF 5.4 MMBO	? 55 MMBO
Endicott	3/78	Sohio	731 BCF 375 MMBO	(Late 87-Early 88)	0	731 BCF 375 MMBO
S. Barrow	4/49	U.S. Navy	25.2 BCF	8/49	17.2 BCF	8 BCF
E. Barrow	5/74	U.S. Navy	12.4 BCF	12/83	3.4 BCF	9 BCF
Totals			35,543.6 BCF 12,375 MMBO		6801.9 BCF ** 5220.7 MMBO	32,754 BCF 7155 MMBO

* BCF - Billion Cubic Feet of Gas
MMBO - Million Barrels of Oil

** Portions of Gas Reinjected

Alaska Department of Natural Resources
Division of Oil and Gas 6/87

Figure 7. North Slope Oil and Gas Fields.

Undeveloped North Slope Oil and Gas Discoveries

As of June 16, 1987

Name	Discovery Date	Company	Estimated Recoverable Reserves
Umiat	12/46	U.S. Navy	50 MMBO
Gubik	8/51	U.S. Navy	600 BCF
E. Umiat	3/63	McCulloch Oil	?
West Sak	4/69	Richfield Oil Corp.	?
Kavik	11/69	Richfield Oil Corp.	?
Kemik	6/72	Forest Oil	?
Flaxman Island	9/75	Exxon USA	?
Pt. Thomson	10/77	Exxon USA	5000 BCF 350 MMBO
Mikkelson	1978	ARCO Alaska	?
Gwydyr Bay	1981	Conoco	<50 MMBO
Tern Island	5/83	Shell Oil	?
Seal Island	1/84	Shell Oil	300 MMBO
Colville Delta	1985	Texaco USA	?
Hammerhead	2/86	Unocal	?
Sandpiper Island	1986	Shell Oil	?

* BCF - Billion Cubic Feet of Gas
MMBO - Million Barrels of Oil

Alaska Department of Natural Resources
Division of Oil and Gas 6/87

Figure 8. Undeveloped North Slope Oil and Gas Discoveries

FIVE-YEAR OIL & GAS LEASING PROGRAM

ALASKA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL & GAS

Proposed Area & Date	1986							1987												1988												1989												1990												1991								
	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
51 Prudhoe Bay Upl. 1-87			PR			F		S																																																								
50 Camden Bay 6-87				R		P				MF			S																																																			
54 Kuparuk Upl. 1-88	A			R											P		MF			S																																												
58 Demarcation Pt. 6-88				R				A												P		MF			S																																							
52 Beaufort Sea 1-89				R									L		A												P		MF			S																																
56 Alaska Peninsula 6-89	C			R														L		A												P		MF			S																											
59 Cook Inlet 1-90				R				C																	L		A												P		MF			S																				
57 N.S. Foothills 6-90				R				C																						L		A												P		MF			S															
64 Kavik 1-91	N			R				D							C																						L		A												P		MF			S								
65 Beaufort Sea 6-91	N			R				D												C																						L		A												P		MF			S			

N = Call for Nominations
R = Request for Comments on Proposed New Sales & 5-Year Schedule Revisions
D = Proposed Sale Area Included in 5-Yr Leasing Document
C = Call for Public Comments

L = Preliminary Land Status Check
A = Agency & Public Comments Requested for Socioeconomic/Environmental Analysis
P = Preliminary Analysis/Preliminary Notice (AS 38.05.945(a)(3))

F = Final Decision/Final Notice of Sale and Terms (AS 38.05.945(a)(4)) Alaska Coastal Management Program Consistency Determination
S = Sale

U. S. DEPARTMENT OF THE INTERIOR

APRIL 1987

FINAL 5-YEAR OCS OIL & GAS LEASING PROGRAM

SALE AREA	SALE DATE	1987	1988	1989	1990	1991	1992
		AMJJASOND	JFMAMJJASOND	JFMAMJJASOND	JFMAMJJASOND	JFMAMJJASOND	JFMAMJ
112 W. Gulf of Mexico	8/87	G NS					
97 Beaufort Sea	1/88	F P G N	S				
113 C. Gulf of Mexico	3/88	EH F P	G N S				
109 Chukchi Sea	5/88	H F P	G NS				
115 W. Gulf of Mexico	8/88	EH F	P G NS				
107 Navarin Basin	10/88	E H	F P G NS				
116 E. Gulf of Mexico	11/88	EH F	P G NS				
91 N. California	2/89	EH	F P G	NS			
96 N. Atlantic	2/89	A	EH F P G	NS			
118 C. Gulf of Mexico	3/89	CD A	EH F P G	N S			
122 W. Gulf of Mexicc	8/89	CD A	EH F	P G N S			
95 S. California	9/89	CD A	EH	F P G NS			
SU1 Supplemental	9/89		C	D I P G NS			
• 121 Mid-Atlantic	10/89	R CD A	EH	F P G NS			
• 120 Norton Basin	12/89	R CD A	E	H F P G NS			
• 101 St. George Basin	2/90	R CD	A	EH F P G	NS		
123 C. Gulf of Mexico	3/90		CD A	EH F P G	N S		
132 N. Aleutian Basin	5/90		CD A	EH F P	G NS		
125 W. Gulf of Mexico	8/90		CD A	EH F	P G N S		
• 114 COA/Cook Inlet	9/90		R CD A	EH	F P G NS		
SU2 Supplemental	9/90			C	D I P G NS		
• 108 S. Atlantic	10/90		R CD A	EH	F P G NS		
119 C. California	11/90		CD A	EH	F P G NS		
124 Beaufort Sea	2/91		CD A		EH F P G	NS	
131 C. Gulf of Mexico	3/91			CD A	EH F P G	N S	
126 Chukchi Sea	5/91			CD A	EH F P	G NS	
135 W. Gulf of Mexico	8/91			CD A	EH F	P G N S	
• 130 Navarin Basin	9/91			R CD A	EH	F P G NS	
SU3 Supplemental	9/91				C	D I P G NS	
137 E. Gulf of Mexico	11/91			CD A	EH F	P G N S	
• 129 Shumagin	1/92			R CD A		EH F P G N	S
• 134 N. Atlantic	2/92			R	CD A	EH F P G	NS
128 N. California	2/92				CD A	EH F P G	NS
139 C. Gulf of Mexico	3/92				CD A	EH F P G	N S
• 132 Washington-Oregon	4/92			R	CD A	EH F P	G N
• 133 Hope Basin	5/92			R	CD A	EH F P	G NS
118 S. California	6/92				CD A	EH F	P G N
• 140 Straits of Florida	6/92				R CD A	EH F	P G N

• Frontier Exploration Sale. Request for interest will be issued if necessary.

R - Request for Interest C - Call for Information & Nominations D - Comments on Call Due

A - Area Identification E - Draft EIS H - Public Hearing F - Final EIS

I - Issue Environmental Assessment for Supplemental Sale P - Proposed Notice of Sale

G - Governor's Comments Due N - Notice of Sale S - Sale

Enclosure A

FISH AND WILDLIFE HABITAT AND RESOURCES IN THE ARCTIC NATIONAL WILDLIFE REFUGE

The ADFG has conducted an extensive review of the resource information as collected by the USFWS, the ADFG, and industry for the ANWR and adjacent lands. This enclosure consists of a summary of the key fish and wildlife resources in the general area of the ANWR coastal plain. Data on distribution and abundance of fish and wildlife are presented, and areas of special concern (e.g., calving areas, insect relief habitat, staging areas, overwintering, and spawning habitats) are highlighted for each species or species group. Fish and wildlife groups and species of importance in the ANWR include fishes, caribou, muskox, moose, bowhead whale, peregrine falcon, waterfowl, shorebirds, wolf, wolverine, foxes, polar bear, brown bear, and ringed seal. Discussions on the various fish and wildlife species are not limited geographically to the 1002 lands but include data pertinent to areas that would be affected by transportation corridors and support activities associated with the exploration and development of oil/gas resources.

FISH

AC	arctic char	LT	lake trout
ACI	arctic cisco	NSB	ninespine stickleback
BB	burbot	PS	pink salmon
CS	chum salmon	RS	red salmon
FSC	fourhorn sculpin	RWF	round whitefish
GR	grayling	SSC	slimy sculpin

Distribution and Abundance

There are ten streams in the 1002 area that are known to contain fish. Twelve species of freshwater or anadromous fish have been identified in these waterbodies. The following is a listing of the streams containing fish and the species present (Bendock 1984, Sonnichsen 1985):

Canning River	AC, ACI, BB, CS, GR, LT, NSB, PS, RS, RWF, SSC
Tamayariak River	GR, NSB
Katakturuk River	AC, NSB
Marsh Creek	AC
Sadlerochit River	AC, GR, LT, NSB, PS
Hulahula River	AC, GR
Okpilak River	AC, GR, LT
Jago River	AC, NSB
Kogotpak River	AC, GR
Aichilik River	AC, ACI, FSC, GR

The Canning River drainage supports the greatest diversity and abundance of fish species in the 1002 area. An aerial survey of the Canning River conducted in September, 1982 upstream of the Marsh Fork resulted in an estimate of 39,000 arctic char (Smith and Glesne 1982). The Canning River differs from other rivers in the 1002 area due to the number and magnitude of perennial ground water sources flowing into the river.

The Aichilik and Hulahula River drainages also support populations of anadromous arctic char. An aerial survey conducted in September, 1982 on a section of the Aichilik documented a large concentration (2,000-4,000) of arctic char located downstream from a spring (ibid.). In 1983 surveys of the Hulahula River, arctic char were found to be widely distributed throughout the drainage. Arctic char were collected in almost all of the areas surveyed as far upstream as East Patuk Creek (Daum, Rost and Smith 1984). Fall concentrations of Arctic char were observed at three holes on the Hulahula River that have historically been used by villagers from Kaktovik (ibid.). Arctic grayling have also been reported from the Canning/Tamayariak River system, the Hulahula/Okpilak River system and the Aichilik River.

No systematic abundance surveys for arctic grayling have been conducted in the 1002 area (ADFG 1986). Some information on catch per unit effort is available from the U.S. Fish and Wildlife Service (USFWS) lake and stream surveys in the area. The Sadlerochit River drainage contains populations of lake and stream resident arctic char and arctic grayling. A dwarf form of arctic char is present in the vicinity of Sadlerochit Springs (Smith and Glesne 1982). Lake resident arctic char, along with arctic grayling and lake trout, are found in Peters and Schrader lakes. Anadromous arctic char have not been positively identified in the drainage (ibid.). Although arctic char are identified as occurring in the Katakturuk River, Marsh Creek and the Jago River, studies conducted by the USFWS indicate that abundance is very low. Those fish captured most likely reflect summer excursions from neighboring drainages.

The lagoon and nearshore waters adjacent to the 1002 study area represent important summer feeding habitat for anadromous arctic char and whitefish. Fish from North Slope drainages disperse along the coast and utilize lagoon and nearshore waters as summer feeding areas. The warmer, less saline nearshore habitats are areas of high seasonal abundance for anadromous fish.

Areas of Special Concern

Overwintering areas probably are the greatest single limiting factor for anadromous and freshwater fish populations because severe winter conditions in the arctic drastically reduce available water supplies. Many sections of river channels and coastal lakes (less than 3 m in depth) freeze solid. Winter flow is generally immeasurable (USFWS 1982). During the winter, water sources are limited to spring areas, deep isolated pools, deep lakes, and brackish river delta areas (ibid.). Most of the spring water sources, as identified below, have been surveyed by the USFWS:

Shublik Spring - 24 cubic feet per second (cfs) of water
Red Hill Spring - .85 cfs
Katakturuk River Tributary Spring - 4.28 cfs
Sadlerochit Spring - 35 to 38.7 cfs
Hulahula River Spring - 4.6 to 7.3 cfs
Okerokivik River Spring - 26 cfs
Aichilik River Spring - 1.5 cfs

Stream channels in the 1002 area exhibit a high degree of braiding and have relatively steep gradients. Pools suitable for supporting overwintering are rare (Smith and Glesne 1982). Perennial ground water sources (springs) are found on most of the major drainages in the 1002 area.

These springs are essential for the spawning and overwintering of arctic char and other resident freshwater fish species. In the 1002 area, arctic char rely extensively on spring-fed habitats at particular stages in their life. Springs are used as spawning grounds, summer rearing areas of fry and juveniles, and as overwintering areas. In smaller North Slope drainages, it is conceivable that a single spring-fed site might harbor virtually all members of a particular arctic char population, from eggs to mature adults during the winter period (ADFG 1986). Perennial groundwater sources generally are discrete areas associated with the foothill and mountainous regions south of the coastal plain.

The Canning River drainage differs to some degree from other rivers in the 1002 area due to the number and magnitude of perennial ground water sources flowing into the river. The cumulative discharge of the springs on the Canning River drainage is one of the largest on the North Slope (USFWS 1982). The largest of these is Shublik Springs located at the southwest end of Coplestone Mountain in the Shublik Mountains. Spawning arctic char appear to be located primarily in the Marsh Fork and the main river above the Marsh Fork confluence (Smith and Glesne 1982). Red Hill Spring located at the western end of the Sadlerochit Mountains, is the only spring identified on the Tamayariak River. It is a hot spring with temperatures at the orifice reported to be between 29.3 and 32.9°C (USFWS 1982). Overwintering habitat has not been documented in the drainage. In the Sadlerochit River system the Sadlerochit spring located at the eastern end of the Sadlerochit Mountains is the only identified spring area. Two large lakes, Lake Peters (775 ha) and Lake Schrader (1450 ha) are located in the headwaters of the Sadlerochit drainage and provide overwintering habitat. Three springs have been identified on the Hulahula River, one of which is located in the 1002 area. These areas are located at the confluence of the Hulahula River and the East and West Patuk creeks, one mile above Old Man Creek and at a location 25 miles downstream from Old Man Creek. Two springs have been identified in the Aichilik River. The springs are located at 69° 31' N latitude and 143° 02' W longitude and 20 km upstream at 69° 22' N latitude and 143° 05' W longitude (Smith and Glesne 1982).

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CARIBOU (*Rangifer tarandus*)

Two caribou herds are found in the ANWR and its environs. The Porcupine Caribou Herd (PCH) consists of approximately 150,000 animals (Whitten 1985) and is one of two international herds ranging between Canada and Alaska. The Central Arctic Herd (CAH) consists of approximately 15,000 animals (Cameron 1986), and is resident on the North Slope between the Canning and Colville Rivers.

Distribution and Movements

Porcupine Caribou Herd

Unless otherwise noted, the following discussion is from ADFG (1986).

The PCH ranges in Alaska between the Canning and Chandalar rivers on the west, east to the Richardson Mountains and Peel River in Canada, and south as far as the Ogilvie Mountains in the Yukon Territory. The PCH winters in the Chandalar, Coleen, and Sheenjek river drainages in Alaska, and in the Ogilvie and Richardson Mountains and Peel River drainages in Canada. During spring of most years, the herd follows traditional migration routes through the British and Davidson Mountains and Firth River valley onto the northern foothills and coastal plain between the Katakturak River in the ANWR and the Babbage River in Canada. During the past 15 years calving has occurred on the coastal plain and northern foothills between the two drainages noted above, although calving has been concentrated in several locations. In most years following calving, cows, and newborn calves form dense aggregations on the coastal plain near Camden Bay. Although these aggregations often form in June prior to significant mosquito emergence, mosquito harassment probably influences the size and movement of these aggregations. During severe mosquito harassment periods, large numbers of caribou (tens of thousands) can be found along the coast, on beaches, shorefast ice, and coastal lagoons (USFWS 1982). Caribou in these aggregations tend to move eastward along the coast, and southeastward into foothills and the mountains and into Canada.

By late July and August, most of the PCH are in the foothills and mountains of the south slope of the Brooks Range, or in Canada (USFWS 1982). A small proportion of the PCH resides on the North Slope year-round, but little is known about these animals.

Central Arctic Herd

Unless otherwise noted the following discussion is from Shideler (1986).

The CAH ranges on the North Slope primarily between the Colville and Canning rivers, although a small proportion of CAH winters in the 1002 area between the upper Sadlerochit and Canning Rivers (Whitten et al. 1985). Movements of the CAH are generally north/south between wintering areas in the foothills, and calving and mosquito relief areas along the coast. Concentrated calving occurs on the coastal plain in two areas--a western concentration between Oliktok and Milne Points, and an eastern concentration between Bullen Point and the Canning River delta. Only the latter calving concentration area is of concern here.

In some years following calving, CAH caribou move eastward across the Canning River toward Camden Bay in the 1002 area, then reverse and head west again. Under severe mosquito harassment, CAH caribou remain near the coast, moving to coastal deltas, points, and other promontories for relief from mosquitos. As mosquito activity abates in late July, CAH animals drift southward toward the foothills, although a small proportion of animals remain as year-long residents on the coastal plain.

Areas of Special Concern

Two types of caribou use areas in the ANWR region merit special concern--calving areas and coastal mosquito relief areas. Although much of the coastal plain between the Babbage River in Canada and the Shaviovik River in Alaska has supported at least some calving in the past, several areas of concentrated calving have been used repeatedly over the years by a large proportion of the PCH and CAH respectively (ADFG 1986). These concentrated calving areas deserve special protection because of their traditional use by caribou. Topographic and climatic effects in the foothills and coastal plain of the upper Jago River, for example, have often resulted in early snow ablation and subsequently early green-up of cottongrass (Eriophorum vaginatum) tussocks (USFWS 1982). PCH caribou use this area heavily during calving, at least in part due to the abundance and availability of this important forage species, as well as forage on nearby riparian benches and associated uplands (Whitten 1985). Although there are no easily identifiable habitat characteristics that explain the use of the CAH concentrated calving area along the Canning and Staines rivers, caribou have traditionally used that area (Shideler 1986) suggesting that it is important.

Coastal mosquito relief habitat, and continued access to that habitat, are especially important to the CAH because it does not use areas of altitudinal variation which can aid in relief from mosquito harassment (Shideler 1986). Thus the coastline between Camden Bay and Prudhoe Bay along with the area within several kilometers are important as mosquito relief habitat, but also as movement corridors back and forth to optimal relief areas (ibid.).

Coastal areas are also important to the PCH because, although some portions of the herd use wind-swept foothills and mountains as mosquito relief areas, a considerable portion, often numbering in the tens of thousands, uses coastal areas as mosquito relief as well as movement corridors back into Canada (ADFG 1986). Much of this use during the post-calving season occurs east of Camden Bay, and inland for several kilometers (Whitten et al.1985). In general, these areas are used for a shorter period of time than is mosquito relief habitat used by the CAH, but because of the larger size of the PCH access to this habitat in the ANWR is particularly important.

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MUSKOX (Ovibos moschatus)

Muskoxen were indigenous to the eastern North Slope of Alaska until they were extirpated there in the late 1800s (Gunn 1982). In 1969, 52 muskoxen from Nunivak Island were released at Barter Island (Gunn 1982, Lent 1978). In 1970, an additional 13 animals were released near the mouth of the Kavik River (ibid.). The descendants of these animals comprise the population of muskoxen that is resident on the eastern North Slope.

Distribution and Abundance

Since the initial reintroduction, the eastern North Slope population of muskoxen has increased to 450 animals (Whitten 1985). This is the second largest muskoxen population in the state, and comprises almost one-third of the state's total number of wild muskoxen (Hinman 1985). This population has exhibited a high growth rate compared to other muskox populations (Robus 1984). Demographic parameters such as an early age at first breeding (2 years old as opposed to three or four years old in other populations), calving in successive years (as opposed to every second or third year in other populations), and high calf survival attest to the excellent habitat quality in the 1002 study area (Jingfors 1984, Robus 1984).

The major areas of muskox distribution on the eastern North Slope are all within the 1002 study area, and are inhabited by approximately 400 animals. An additional 50 animals (approximately) are located outside the study area, with some ranging as far west as the Trans-Alaska Pipeline System (TAPS) and others ranging east into the northern Yukon Territory. Of these 50 or so animals, one herd of approximately 10 animals of mixed sex ranges along the middle and upper Kavik River (Reynolds et al. 1985, Whitten 1985); the remainder are solitary, adult bulls which wander widely, but probably serve an important role in pioneering new winter ranges which are eventually occupied by larger groups.

There are three major areas of muskox distribution on the eastern North Slope (Jingfors and Klein 1982). These areas are centered along three of the river systems within the 1002 area--the Tamayariak, Sadlerochit, and Okerokovik rivers. All or part of each of these three areas have been used by muskoxen since the early 1970s (Reynolds et al. 1985). Muskoxen movements within these areas are influenced by forage availability and quality during most of the year; however, mosquito harassment in July and the disruption of herd cohesiveness by rutting bulls in August may influence local movements during these seasons.

Within each of the three major areas, calving areas have overlapped considerably. Jingfors (1984) documented repeated use of the same calving area by the Sadlerochit herd between 1978 and 1980. Reynolds et al. (1985) documented repeated use of the same general area for calving in all three major areas between 1982 and 1984. The size of the calving areas appears to have expanded as the herd has increased. The calving areas are located along the Coastal Plain, generally within 15 miles of the coast, and in upland areas characterized by newly emergent cottongrass tussocks (Eriophorum vaginatum) and/or wind-blown upland areas where snow has ablated.

Although there is a tendency for mixed sex and age herds to remain within the same major area, this affinity is not absolute; there is some movement by these herds into the other major areas. Much of the movement between areas is by adult bulls that tend to remain solitary, or in small (2-5 individuals) groups, and to wander back and forth throughout the region rather than to remain associated with any particular area (Reynolds et al. 1985).

Seasonal Movements and Habitat Use

Muskoxen are generally associated with riparian areas and adjacent uplands. Seasonal movements are mostly in a north/south orientation following the phenology and availability of forage plants along the major river systems with which muskoxen are associated. Localized elevational movements following the seasonal availability of forage occur during the general movements. During the mosquito season muskoxen may move temporarily to windy areas to avoid mosquito harassment but these movements are not comparable to the extensive latitudinal movements of caribou to coastal areas. During the rut, competition between muskox herd bulls and potential interlopers may result in herds fragmenting into small harems until the breeding activity declines and the harems coalesce again into herds. During winter herd size reaches a maximum as individual herds encounter each other on winter range and join and split.

The general pattern of habitat use is for muskoxen to be distributed during winter in mixed herds of 20-30 (occasionally up to 100) animals that remain on wind-blown upland and bench areas along riparian systems where the animals can minimize the amount of energy expenditure that would be caused by cratering for forage. As spring approaches and cottongrass tussocks (Eriophorum vaginatum) begin to green up, muskoxen move to these tussock areas where most of the herd feeds and where calving takes place. The herds remain sedentary near the calving area until the calves are old enough to travel. As spring progresses muskoxen move to river bars and riparian benches where forbs such as oxytrope (*Oxytropis*), mountain-avens (*Dryas integrifolia*), and fireweed (*Epilobium*) become available. Muskoxen remain in these riparian areas and gradually shift to feeding on willow in late June and through July as the leaves begin to emerge. Riparian willow remains a mainstay of the summer diet until August when rutting commences and herds move to side drainages and creeks and leave the major river systems. During the rut muskoxen feed on sedges that are just greening up in marshy areas along these smaller creeks. During fall, muskoxen move from the side drainages back to the major river systems where they remain feeding on riparian willow until snow becomes deep enough that they must move to adjacent upland areas.

Areas of Special Concern

Although much of the riparian and adjacent upland habitat of the Coastal Plain portion of the Tamayariak, Sadlerochit, and Oklerokovik rivers may be used by muskoxen, two types of use areas are of special concern. These are calving areas and winter feeding areas. Calving areas are a concern not only because they appear to be associated with unique habitat characteristics--i.e., south-facing slopes where early snow-melt allows green-up of cottongrass tussocks (*Eriophorum vaginatum*)--but also because human disturbance during the calving period can result in calves or cow/calf pairs being abandoned by the remainder of the herd. Because muskoxen rely on herd defense against predators rather than on escape by flight, the survival of young calves is dependent on their being able to remain with the herd.

Winter feeding areas are found along upland benches and ridges along the major river systems with which muskoxen are associated. These areas occur where snow depth is shallow due to the topographic features, and forage composition is sufficient to provide nutrition over the winter. Because almost the entire herd of each major area can use these wintering areas, destruction of these areas can have far-reaching effects.

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MOOSE (Alces alces gigas)

Distribution and Abundance

Unless specifically noted, information presented below is from the Alaska Habitat Management Guide for the Arctic Region (ADFG, 1986).

Moose (Alces alces gigas) occur throughout most of the Arctic Region, and are seasonally distributed over the Arctic Coastal Plain. They have been counted in most of the major river drainages from the Kongakut (on the east) to the Utukok (on the west). The seasonal distribution of moose is affected by factors such as the quantity and quality of riparian willow (winter habitat), snow conditions, and insect harassment, among others. Only winter concentration areas are delineated in the ANWR area, and movements between seasonal ranges have not been documented. Even in non-winter months, when moose are distributed north onto the coastal plain, riparian zones in river valleys remain important to moose. Major drainages such as the Canning, Jago, Hulahula, and Aichilik Rivers (within the ANWR 1002 area) and the Sagavanirktok, Kavik, and Shaviovik Rivers (between Prudhoe Bay and ANWR), as well as smaller creeks and rivers, probably comprise the most valuable habitat areas.

Historical and archeological evidence suggests that moose, once rare on the Arctic Coastal Plain, became more abundant during the 1940s. Numbers continued to increase from the 1950s into the 1970s, with little change in distribution. Densities on Alaska's North Slope appear highest between the Colville and Canning rivers, although moose occur outside this zone, along most major stream corridors. In the area between the Dalton Highway and the Canning River, the ADFG in 1985 estimated moose numbers at 600-650 animals, based upon 1984 aerial surveys. In the area east of the Canning (ANWR), 330-360 moose were estimated. Aerial surveys conducted in the spring have documented higher numbers of moose, indicating that these units have supported greater numbers of moose than previously thought. These increases were attributed to excellent sighting conditions, since productivity and survival are insufficient to support rapid population growth (Whitten, 1986).

Surveys indicate a high degree of utilization of annual growth of browse species, and population trends show an inverse relationship between total numbers of adults and percentages of calves. This suggests that browse may limit moose populations here.

Areas of Special Concern

Habitats associated with riparian corridors are of particular value to moose. These areas provide shrubby browse, cover, insect relief areas, and probably serve as movement corridors to and from winter concentration areas which lie in major drainages upstream (south) of the study area.

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BOWHEAD WHALE (Balaena mysticetus)

Distribution and Abundance

Unless specifcally noted, information presented below is from the Alaska Habitat Management Guide for the Arctic Region (ADFG, 1986).

Bowhead whales are distributed in arctic and subarctic waters adjacent to the northern and western coasts of Alaska. They migrate in association with the seasonal movement of sea ice, traveling from wintering areas of the west central Bering Sea through the eastern Chukchi Sea and Beaufort Sea into summering areas in Alaskan and Canadian waters.

Interest in this species has increased in recent years because of its endangered status, its importance to subsistence hunters, and the large increase in exploratory and industrial activities in arctic waters.

Most bowheads of the western arctic population probably winter (January-March) in the west central Bering Sea adjacent to the pack ice edge, which usually occurs between St. Lawrence and St. Matthew islands. The summer range (June-August) of the bowhead whale extends throughout the eastern Beaufort Sea; major concentrations occur in Amundsen Gulf and the Canadian Beaufort Sea east of Herschel Island and northward. Some bowheads do not complete the spring migration into Canadian waters, and instead spend the summer months in the northern Chukchi and/or the western Beaufort Sea. These whales are suspected to be late migrants that feed and summer in Alaskan waters.

In September and October, bowheads begin to migrate westward over a broad front along the Alaskan coast, sometimes in shallow, nearshore waters (10-50 m), apparently feeding along the way. Autumn feeding concentration areas are: 1) east of Barter Island to at least the United States-Canada demarcation line (141°W); and 2) east of Barrow to Pitt Point.

The bowhead whale is one of the few marine mammals that spends all or most of its life in or near the edge of the arctic ice pack, migrating north in the spring as the ice recedes and moving south as pack ice reforms in winter. The migration route, their distribution along the migration pathway, and the rate of migration are influenced primarily by ice conditions and the presence or absence of open water areas.

The predominant activity of bowheads in summer and autumn is feeding (Richardson et al. 1983). Copepods and euphausiids are the main food items for bowheads in the Alaskan Beaufort Sea during early autumn and presumably are also important to bowheads in summer. Thus, factors affecting the availability of these and other foods in the eastern Beaufort Sea probably have a strong influence on the distribution of bowheads.

Bowhead whales of the western arctic population begin to leave their wintering areas between St. Lawrence and St. Matthew Islands in the central Bering Sea in April and May. The northward movements appear to be timed with the development of shore leads and the breakup of pack ice, and they vary considerably from year to year. Migration occurs along at least two routes to the Bering Strait: one route close to the western end of St. Lawrence Island and another farther offshore. A smaller number of bowheads may travel past the eastern end of St. Lawrence Island, but this route does not appear to be a major one.

Most bowheads have arrived at Bering Strait by early May, depending upon ice conditions. North of Bering Strait, bowheads move northeast across outer Kotzebue Sound, with some using a recurring polynya between Kivalina and Point Hope and others travelling up to 45 km offshore. Bowheads follow open leads north past Cape Thompson and then northeast past Cape Lisburne in the nearshore lead. Past Barrow the principal migration takes place from the last week of April through May. The earliest and latest recorded dates of bowhead northward migration past Barrow are March 29 and June 19, respectively.

Past Point Barrow, bowheads migrate northeast in the extensive lead system and shear zone in the northern Beaufort Sea. This system may occur up to 600 km north of the Canadian Beaufort Sea coast, and therefore whales may migrate well offshore. Bowheads reach Banks, Prince Albert, and Victoria islands in Canadian waters in late May and early June, and as the ice further recedes they move south and east as far as Amundsen Gulf. The spring bowhead migration past Point Barrow appears to occur in three or four pulses. Younger individuals are the earlier migrants, and larger, older males and females with calves compose the later waves. These pulses in migration are closely related to weather and ice conditions. Whales appear to congregate in open water areas until leads in the ice appear offshore.

In July, bowheads are present throughout the Amundsen Gulf area; however, current information is insufficient to precisely identify bowhead distribution in this area. Bowheads also occur in the eastern Beaufort Sea waters of Prince of Wales Strait between Banks and Victoria islands and may occur in M'Clure Strait and Viscount Melville Sound.

They have been observed in water depths of 50 m near Cape Bathurst (Northwest Territories). There appears to be a southwestward shift in the bowhead range during August, with many whales occurring in the shallow waters of the Mackenzie River delta region.

Bowheads begin to move out of their summering grounds in the Canadian Beaufort Sea in mid August, with the major portion of the migration occurring in September. This westward movement occurs over a broad front, with swimming speeds estimated at up to 4 km/hr. Bowheads are found at all depths during this time; however, a shift in distribution occurs in mid September as more bowheads are found in shallower water (20-50 m) nearshore. It has been suggested that this nearshore movement occurs because of pelagic prey concentrations found at this time.

Based on the 1981 aerial surveys of the eastern Beaufort Sea and data collected from shore-fast ice counting stations, the International Whaling Commission (IWC) in 1982 established a minimum population estimate for the western arctic bowhead whale at 3,857 animals. The 1985 IWC official estimate was 4,417 whales, with a 95 percent confidence interval (2,613-6,221).

Bowhead whales are classified as endangered and are protected under the Endangered Species Conservation Act (ESA) of 1969 (PL 91-135) and Marine Mammal Protection Act of 1972 (MMPA, PL 92-522). The National Marine Fisheries Service (NOAA, U.S. Department of Commerce) oversees bowhead whales for the federal government. Bowhead whales have been completely protected from commercial whaling since 1946 by the International Convention for the Regulation of Whaling, the same treaty that set up the IWC. The MMPA restricts the importation of marine mammal products and allows only Alaskan Natives to take bowhead whales for subsistence and for creating handicraft items and clothing for personal use and sale. The MMPA and ESA allow for regulation of subsistence take if the stock is declared depleted.

Areas of Special Concern

With regard to the present oil/gas leasing decisions (i.e., ANWR, Sale 50, 55) an area of particular interest and concern for bowhead whales is the area east of Barter Island used for feeding. Additionally, the whales use shallow nearshore Alaska coastal waters (20 m and deeper) as a fall migratory corridor under some ice conditions. Thus, the nearshore coast from the Alaska/Canada border well past the ANWR area (as far west as Camden Bay) must be considered as important for the whales and for subsistence whaling activities.

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PEREGRINE FALCON (Falco peregrinus tundrius)

Peregrine falcons, the arctic subspecies, are presently classified as a threatened species by the USFWS.

Distribution and Abundance

Except as specifically noted, the information presented below is drawn from the Initial Report Baseline Study of the Fish, Wildlife, and their Habitats, Arctic National Wildlife Refuge Coastal Plain Resource Assessment (USFWS, 1982).

The peregrine falcon is a rare summer resident and possible breeder within the ANWR coastal plain. During migrations, it is not uncommon to see peregrine falcons along the coast, where they probably prey upon shorebirds and passerines. Migration routes for peregrine falcons using the North Slope probably lie both along the Brooks Range and the arctic coast, so many more birds than the resident population probably move through the ANWR, especially during the fall.

The current status of this species within the 1002 area of the ANWR is uncertain. Poor habitat quality, relative to areas further south with greater relief, limits the potential of the area to support nesting peregrine falcons. At the current time, no nesting pairs are known within the ANWR 1002 area, although one male bird has been seen defending a territory near the southern boundary of the area in the Jago River drainage (R. Ambrose, 1986). This is a sign that nesting could take place in this location, given the dispersal of birds from other habitat areas saturated to capacity with peregrine falcons. The coastal plain between Prudhoe Bay and the Canning River represents a major data gap in knowledge of the distribution of this species. Surveys to gather this information may be conducted in the summer of 1986 (R. Ambrose, 1986).

Although little "classic" nesting habitat exists in the area between the Sagavanirktok River and the Canadian boundary, the present general rising trend in population level for peregrine falcons makes it likely that marginal habitats (e.g., dirt bluffs) may be occupied in the near future. Therefore, some establishment of nests within the area under consideration can be expected, although potential sites are, at this time, unknown (R. Ambrose, 1986).

Peregrine falcons are known to nest along the Sagavanirktok River. Multiple eyries are located along Franklin Bluffs on the east side of the river, and again at two bluff areas on the west side of the river near Sagwon.

Areas of Special Concern

There are no areas of special concern within the immediate area of the 1002 lands. Multiple eyries do exist along the Sagavanirktok River and these eyreis plus the riparian habitat of the Sagavanirktok River in the general vicinity of these nest sites is considered essential for peregrine falcons.

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WATERFOWL

Unless specifically noted, information presented below is from the Alaska Habitat Management Guide--Arctic Region (ADF&G 1986), or the 1002 baseline report (USFWS 1982).

Tremendous numbers of waterfowl move into the coastal areas of arctic Alaska in the spring. Timing of migration is related to the pattern of spring breakup, and birds move into the nesting areas via the MacKenzie and Yukon rivers and along the coastlines. Around mid-July, many waterfowl species shift from breeding areas to lakes, ponds, and coastal areas to molt. As freeze-up approaches, birds generally move out of the north along the same routes used in spring.

Distribution and Abundance

Tundra (Whistling) Swans

Approximately 800 tundra swans summer on the North Slope, 200 or more of which are found in the ANWR. Nesting occurs in river delta areas, especially ponds and lakes in and near drained-basin complexes. Tundra swans nest and reside in traditional concentration areas on the coastal plain. The major concentration areas in the ANWR are the Canning-Tamayariak, Hulahula-Okpilak, and the Aichilik-Egaksrak-Kongakut river deltas, and the Demarcation Bay and Barter Island lakes. The overall density of swans is lower on the coastal plain of the ANWR than elsewhere on the North Slope. However, the density of nesting swans in the ANWR, especially the Canning-Tamayariak river delta, is equal to or higher than nesting densities elsewhere on the North Slope.

Canada Goose

This species migrates to the ANWR in late May from the east and departs to the east during late August.

Canada geese have been reported nesting in few locations on the arctic coastal plain. Approximately 200-300 pairs of Canada geese nest along the Colville River. A few pairs nest on islands (e.g., Howe Island, Duck Islands, Tigvariak Island) near Prudhoe Bay. In the Canning River drainage, the Canada goose is a fairly common breeder and a common migrant. Following the breeding season a molt migration to the west is apparent in late June to early July as nonbreeders and failed breeders vacate tundra habitats and migrate west, probably to the Teshekpuk Lake goose molting area. Birds which do not reach Teshekpuk Lake before becoming flightless often spend the feather molting period in July in river delta habitats. About 15,000 Canada geese molt along the Beaufort Sea coast from Smith Bay in the National Petroleum Reserve-Alaska to the Canning River.

Black Brant

During spring migration (eastward) along the ANWR coast, brant tend to follow lagoon shorelines and cut across points of land, sometimes leading them 1-5 kilometers inland. The tendency for brant to use the lagoon shorelines in spring may be related to their use of the coastal vegetated mudflats which are usually located on gradually sloping lagoon shorelines.

Brant breed sparingly on the Alaska Beaufort Sea coast, apparently more commonly in the western portion than the eastern segment. A total of 293 nests have been observed in the Colville River delta. In the Prudhoe Bay area, a few brant nest in the river delta areas and on some offshore islands. In the ANWR, a colony of 15 pairs was documented nesting at the Okpilak River Delta. In the Canning River drainage, the black brant is an uncommon breeder and common-to-abundant migrant (+24,000).

In fall, brant appear to be confined to a narrow corridor along the Beaufort Sea coast. General movement is to the west.

White-fronted goose

The estimated breeding population of white-fronted geese on the Arctic slope is 50,000 birds. White-fronted geese are a fairly common breeder from the central arctic slope (Sagavanirktok River region) to the west. White-fronted geese molt in small flocks throughout much of the arctic coastal plain, although they are most concentrated on a few lakes near Teshekpuk Lake in National Petroleum Reserve, where up to 4,900 geese have been counted during the molt period. East of the Sagavanirktok River drainage, this species seems to be much less common. In the ANWR, this species is commonly observed in spring, is absent by mid-summer, and is again commonly observed as an eastward fall migrant.

Snow Goose

The only known breeding colony of snow geese in the United States is located on Howe and Duck islands in the outer Sagavanirktok River delta in the Prudhoe Bay area where approximately 60 pairs nest. Scattered pairs are found nesting in other locations, such as Flaxman Island. In the ANWR, there are typically small flocks of snow geese (five to 75 birds) noted in June, with the net direction of movement often uncertain. In August, there is a massive influx of snow geese into the coastal plain of the ANWR from the Northwest Territories. The most consistently used areas in the ANWR are east of the Hulahula River in the vicinity of Barter Island. However, this westward influx of snow geese occasionally extends to the Canning River. During a normal year, this westward movement is followed by a one or two week period of predominantly resting and feeding (staging) activities. Snow geese normally depart the ANWR by late September but have been observed in the area as late as mid October. The geese apparently remain in the staging areas long enough to accumulate sufficient energy reserves for fall southward migration, regardless of weather conditions.

The maximum estimated number of snow geese occurring on the ANWR was 325,760 in 1978. During the period 1973-1984 there were 3 years in which the estimated numbers were greater than 190,000, there were 4 years in which there were between 40,000 and 110,000, and 4 years in which there were 20,000 or fewer birds. Annual variation occurs in the staging areas used, the numbers of snow geese using each area, and the duration of use. Weather most likely exerts the major influence upon timing and extent of movements from the breeding areas to the staging areas (Garner and Reynolds 1985 Appendix 7 - Table 3).

Pintail

The pintail is considered to be the most numerous duck on the arctic coastal plain, although in the ANWR it usually is not as common as the oldsquaw. The breeding population of pintails on the arctic slope has been estimated at 120,500 birds. In years of drought in the southern prairies, pintail occur in greater numbers in the arctic. Nesting seems to be more frequent in the western portions of the arctic coastal plain than in the eastern portions. However in the ANWR, pintails are fairly common breeders and fall migrants in the Okpilik River area, common summer residents and fairly common breeders on the Jago River, and are uncommon breeders and spring migrants on the Katakurak River area. In the Canning River drainage, pintails are considered very common migrants, a common summer resident, and a rare breeder.

Green-winged Teal

Green-winged teal are relatively rare on the North Slope but occur throughout the area in small numbers. The breeding population of teal has been estimated to be 4,200 birds on the arctic slope. Green-winged teal breed in the interior arctic coastal plain.

American Widgeon

This species has been described as having a widely scattered light population. In the ANWR, widgeon appear to be frequent migrants.

Oldsquaw

Oldsquaws are the most numerous duck in the ANWR, but to the west they are outnumbered by pintails in some sites. Widespread breeding is recorded across the arctic coastal plain and into the Brooks Range. Oldsquaws are abundant during the molt period on the coastal lagoons and on large lakes of the arctic coastal plain.

Common Eider

Common eiders are found nesting on spits and beaches along the entire Alaska Beaufort Sea coast, and they nest colonially on barrier islands. Small numbers are sometimes seen on the tundra in spring, and small flocks have been seen flying west in mid-to-late June in the ANWR. In the Canning River drainage eiders are considered to be an uncommon breeder but a fairly common migrant.

Mallard

Mallards have been regularly recorded in small numbers over various parts of the North Slope. At the Jago River in the ANWR, mallards are a rare summer visitant and breeder. The mallard breeding population is estimated to be about 500 birds on the entire arctic slope.

Areas of Special Concern

Several habitat areas are identified as essential to the well-being of waterfowl.

> Barrier island areas are important to eider duck nesting. Vegetated islands such as Barter, Flaxman, and Tigvariak are attractive nesting areas to many species of waterfowl.
>
> Protected waters (lagoons, bays, estuaries, and coastal lakes) are important resting, feeding, and molting areas for the majority of waterfowl species.
>
> Lagoon shorelines are important resting and feeding areas for waterfowl. Vegetated coastal mudflats are believed to be essential feeding areas for arriving black brant during the spring migration.

River delta areas are favored by all waterfowl as nesting, resting, molting, and feeding areas. Coastal spits and mudflats are also favored resting and feeding areas for waterfowl.

The entire arctic coastal plain of the ANWR has been utilized by snow geese for feeding and resting activities. The most consistent area of use in the ANWR 1002 area, however, has been from the Hulahula River (Barter Island vicinity) east to the Aichilik River. The area of use extends from the coast inland to about the 305 meter (1,000 ft) elevation contour line.

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SHOREBIRDS

Distribution and Abundance

Unless otherwise noted in the text, the following material has been paraphrased from the Initial Report Baseline Study of the Fish, Wildlife, and Their Habitats, Arctic National Wildlife Refuge Coastal Plain Resource Assessment (USFWS, 1982).

Shorebirds of the families Charadriidae and Scolopacidae are the dominant breeding birds of the Alaskan Arctic Coastal Plain. Studies from the coastal and inland areas of the region, as well as across its east-west extent have investigated aspects of life history, habitat use, energetics, etc. However, much remains to be discovered, and insufficient data exist at present to make estimates of total population size for most species. More than 100 species of birds have been recorded within the ANWR 1002 study area, with at least 26 shorebird species being represented. Of these, the golden plover, ruddy turnstone, red-necked phalarope, red phalarope, semipalmated sandpiper, Baird's sandpiper, pectoral sandpiper, dunlin, and buff-breasted sandpipers are the most common breeders and residents. Several other species (e.g. sanderling, long-billed dowitcher) are uncommon in the ANWR coastal plain during the breeding season, but increase in numbers dramatically during migration periods. This portion of the coastal plain is important to some species only because it serves as a migration corridor for birds on their way to summering areas elsewhere.

Breeding bird studies from different locations along the Alaskan Arctic Coastal Plain indicate that the densities in the eastern portion (i.e., ANWR) are lower than elsewhere, especially near Barrow (although methodological differences may contribute to the apparent magnitude of these results). Also, topographic and geomorpholgic differences between the ANWR study area and regions further west tend to restrict the amount of good shorebird habitat available in the 1002 study area. The width of the coastal plain is much narrower on ANWR than further west, and a larger proportion of upland, mesic tundra inland from the coast reduces the value of the eastern coastal plain to most shorebird species. Although nesting shorebird species differ in specific habitat preferences, they in general prefer wetter sites. Since inland areas in ANWR have more relief, better drainage, and more shrubs, areas suitable for nesting are less available than near the coast. As a result, breeding shorebirds are nearly twice as dense at the coast than inland.

Few studies of shorebirds have been undertaken between the Canning and Sag Rivers. However, the general relationships of shorebirds to their habitat on the North Slope seem to be consistent, based on the observations made at widely separated points, and it is assumed that the same patterns of use exist in this area.

Perhaps the most striking aspect of summer use of the coastal plain habitats by shorebirds is the shift of birds from inland to the coast which begins after courtship is completed. In several species, one sex of each pair leaves the nesting area and moves to premigration areas on the coast. These birds are joined successively by unsuccessful breeders, females that have completed breeding, non-breeders, and young-of-the-year. This results in a gradual shift in the center of distribution and in habitat use, beginning in late July and continuing through the early and middle parts of August. Thus, while a variety of habitats are used for courtship and breeding (including uplands), wet habitat types, and especially wet areas near the coast are important for shorebirds using the ANWR study area and adjacent lands to the west. One study found that wet sedge meadow was the most important habitat both in terms of numbers of species and individuals. However, it was noted that often the importance of these areas was enhanced by the presence of other habitats ("very wet sedge meadow" and "moist sedge meadow") nearby. Like many wildlife species, shorebirds seemingly benefit from habitat diversity. Another important habitat for shorebirds was "wet saline tundra."

Shorebird concentrations in coastal habitats double or triple after late July, and then decline steadily (with the exception of pulses as migrations move through the area) as birds emigrate.

Areas of Special Concern

Shorebirds dominate the use of mainland shore habitats while waterfowl tend to dominate spit and lagoon areas. Of these areas, river "dunes" which were windswept and snow-free early in the season, and "wet saline tundra" at the head of bays (except during spring migraton when these areas were ice-covered), were the areas of most importance to shorebirds. Brackish mudflats in the littoral zone are important to migrating shorebirds, and are used heavily as the shoreward shift described above takes place. Turnover rates are high at this time, indicating that birds are continually moving through the area and being replaced by newcomers.

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WOLF (*Canis lupus*)

Distribution and Abundance

Observations of wolves within the 1002 study area are sparse. Weiler et al. (1985) summarize reported wolf sitings on and adjacent to the coastal plain of the ANWR occurring between 1969 and 1984. The majority of such sitings occurred to the south of the coastal plain in the foothills and mountain valleys of the Brooks Range.

Radiotelemetry studies of wolves were initiated in 1984 by the USFWS and ADFG. Eleven wolves were collared between May 19 and July 5, mostly on an opportunistic basis during caribou surveys (Weiler et al. 1985). Activity areas were identified for the Sadlerochit, Aichilik, and Kongakut packs. The Aichilik pack showed the greatest use of the 1002 study area (primarily between the Aichilik and the upper Okerokovik rivers), but the majority of its range fell outside the 1002 boundary. The Kongakut pack was found well to the east of the 1002 area, while a very small proportion of the Sadlerochit pack's activity area fell within the 1002 boundary. Observations of the Canning River and Old Man Creek packs placed them well south of the 1002 boundary. Weiler et al. (1985) observed individual wolves within the 1002 area on several occasions in 1984 but concluded that there appeared to be little use of the coastal plain west of the Aichilik River, at least during mid- and late summer. Coastal plain use by wolves was much higher east of the Aichilik.

Telemetry work continued during the 1985 field season with the collaring of 15 wolves, mostly incidental to grizzly bear studies (Weiler 1986). The distribution of wolves once again showed that identified packs had activity areas lying largely outside the 1002 study area, with occasional lone or dispersing individuals found on the coastal plain. The loss of one pack in 1984 from hunting mortality (Weiler et al. 1985) and the loss of two packs in 1985 from rabies and hunting mortality, along with the appearance of two new packs in 1985, indicates a dynamic situation with regard to wolf distribution on the ANWR (Weiler 1986).

The overall abundance of wolves on or adjacent to the ANWR coastal plain was similar in 1984 and 1985. Weiler et al. (1985) reported a minimum of 27 adult wolves and seven pups using the northern portion of the ANWR in late summer 1984. Twelve mortalities were known to have occurred during the winter of 1984-85, leaving a minimum late summer population of 22 adults and 14 pups in 1985. These authors also report that wolf populations on the North Slope are considered low as compared to their abundance prior to the intensive aerial wolf hunting and predator control that occurred in the early to mid-1950s. Weiler et al. (1985), citing a series of authors, state that "prey abundance, social dynamics of packs, human disturbance and harvest levels, diseases, and other ecological factors . . ." apparently influence wolf density in a given range. Mortality data reported by Weiler (1986) indicate that of 34 wolves alive in late summer 1984, 12 died during the winter of 1984-85 from hunting, disease (rabies), and unknown causes. Subsequently, 14 pups were produced in 1985, which provided a rough balance between population additions and losses, if documented emigration and potential immigration are assumed in balance. Seven mortalities documented during the winter of 1983-84 were all hunter kills, but losses from disease and other causes, if any, were unmeasurable in the absence of collared individuals during this period. We may conclude on the preceding evidence that hunting and disease have influenced wolf abundance or the ANWR over the last several years.

Areas of Special Concern

Wolves are highly mobile predators. Their distribution seems to depend upon prey availability rather than upon the physical structure of their habitat (Paradiso and Nowak 1982). Nevertheless, one component of physical habitat, the availability of den sites, is important to wolf reproduction. Wolf dens in arctic Alaska may be excavated in thawed ground found in "cut banks, escarpments, dunes, kames, and moraines . . ." (Weiler et al. 1985). Haugen (1985) studied den sites on the Canning and Kongakut rivers during 1983 and 1984. The Canning River den site consisted of six major holes in a mound lying 15-25 m from the river and measuring 50 m long by 4 m high, and the Kongakut River den site consisted of two dens in a southfacing ridge within 300 m of the main river channel. Weiler (1986) reported that all den sites located during recent ANWR wolf studies have been found in the mountains rather than the coastal plain; however, wolves do "den on the coastal plain to the west of ANWR" (Weiler et al. 1985).

Dens are used by the parturient female and pups for 8 to 10 weeks (Paradiso and Nowak 1982). Haugen (1985) observed the dominant male, the maternal female, and a subdominant female present at the Kongakut den site for several weeks (presumably after parturition had occurred) before seeing two subdominant males and another subdominant female near the den. The subordinate wolves visited the den on a regular basis, although at a lower appearance rate than the dominant pair. Thus, during the denning period, breeding pairs appear to have limited mobility, and the successful rearing of offspring may depend on free and undisturbed use of key denning habitat.

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WOLVERINE (Gulo gulo)

Distribution and Abundance

Wolverines occur across the northern United States and Canada at relatively low densities (Wilson 1982). In Alaska, wolverines are found in both tundra and taiga regions (Mauer 1985). Of 11 observations of wolverines on the ANWR in 1984, four were within the 1002 study area and the remainder were in foothills or mountains south of the coastal plain (Mauer 1985). Aerial observations made in 1985 in conjunction with grizzly bear and wolf research failed to reveal any wolverines; however, five or six incidental observations of wolverines (including those made in the mountains outside the 1002 area) were recorded on the northern portion of the ANWR in 1985 (Mauer 1986). Observations prior to 1984 indicate few wolverines on the coastal plain. Only one of 10 sitings made north of the continental divide during baseline studies by Arctic Gas Limited in the early 1970s occurred on the coastal plain, but wolverines apparently occur in all types of arctic terrain (Mauer 1985).

Although wolverines occur at densities ranging from 1/55 km^2 to 1/74 km^2 in the arctic foothills of northwestern Alaska (Mauer 1985), the difficulty in observing, and failure to capture, wolverines in the northern portion of the ANWR may indicate that wolverine densities there are considerably lower than in other areas of northern Alaska (Mauer 1986).

Areas of Special Concern

Wolverines exhibit considerable mobility. In northwestern Alaska, female wolverines had home ranges averaging 115 km^2 and male wolverines had home ranges averaging 666 km^2 (Mauer 1985). When pursued, individual wolverines have moved up to 65 km without resting (Wilson 1982). Thus, wolverines may avoid most disturbances by using their mobility. Nevertheless, lactating females may restrict their range of movement "during March and April when young are born and reared" (Mauer 1985). Therefore, denning may be the most sensitive life function of wolverines.

In Lapland, wolverines den in tunnels up to 40 m long dug beneath the snow, often in ravines (Wilson 1982). In northwestern Alaska, "remnant snow drifts in small drainages with associated meltwater caverns were an important rearing habitat used by maternal females and their offspring" (Mauer 1985). It is reasonable to expect that similar denning and rearing habitat is used by wolverines on the ANWR; however, no denning studies have been done on the refuge. Although at least one author cited in Wilson (1982) believed that the availability of wolverine denning sites influenced territory size, it is not known whether or not such availability affects wolverine abundance on the ANWR.

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FOXES (Vulpes vulpes and Alopex lagopus)

Two species of fox occur on Alaska's North Slope: the red fox (Vulpes vulpes) and the arctic fox (Alopex lagopus). The following discussion will treat both species; however, most available information addresses arctic foxes.

Distribution and Abundance

Red Fox

The red fox occurs throughout most of the United States and nearly all of Canada. In Alaska, the northern limit of red fox distribution appears to be the arctic coastal plain (Samuel and Nelson 1982). Eberhardt (1977) found red fox dens as far north as Alyeska Pump Station #2 near the boundary between northern foothills and the arctic coastal plain. Chesemore (1967) stated that few red foxes occurred in the Teshekpuk Lake area and were among species of furbearers that either were sparsely distributed or tended "to concentrate in the foothills and mountains of the Brooks Range." Red fox distribution in the ANWR has not been studied; however, aerial surveys related to pipeline baseline studies in the early 1970s did locate the dens of red foxes "along or near rivers in the mountains and foothills" (Eberhardt 1977). Based on the preceding references, it appears that red foxes may be largely absent from the coastal plain and the 1002 study area but likely occur in the foothills and mountains to the south. Eberhardt's (1977) work showed that red fox dens were located along river valleys; thus, mid- and upper portions of the drainages between the Sagavanirktok and the U.S.-Canada border may be assumed to support red foxes.

The abundance of red foxes in northeast Alaska is unknown. In the lower 48 states, home ranges of radio-collared foxes in diverse habitat varied from 57.5 to 161.9 hectares but increased to "5.12 km^2 for an adult male in a less diverse farming area" (Samuel and Nelson 1982). It is unlikely that red foxes reach these densities at the northern extreme of their distribution in Alaska. Eberhardt (1977) found a mean distance of 6.1 km between occupied dens in the Sagavanirktok River valley, which is a crude indication of red fox abundance in riverine habitats of northern Alaska.

Arctic Fox

The arctic fox has a circumpolar distribution which includes the northern portion of Alaska (Underwood and Mosher 1982). Chesemore (1967) cites several references describing the general occurrence of arctic foxes in Alaska along the arctic coast to the U.S.-Canada border. Specific studies of arctic foxes have been conducted in the Teshekpuk Lake area (Chesemore 1967), the Prudhoe Bay area (Eberhardt 1977, Fine 1980), the Sagavanirktok River valley (Eberhardt 1977), and Demarcation Bay in the ANWR (Burgess 1984). Eberhardt (1977) found that "arctic foxes denned only on the level tundra plain north of the confluence of the Sagavanirktok and Ivishak rivers and west of Franklin Bluffs." The general limitation of arctic foxes to the coastal plain may be influenced by red foxes preying upon them and by interspecific competition between arctic and red foxes (Chesemore 1967; Eberhardt 1977).

Arctic foxes exhibit highly adaptive physiological and morphological characteristics for life in the arctic (Underwood and Mosher 1982) which allow them "to move seasonally between summer breeding habitats in wet tundra and winter habitats, where they are widely dispersed on the coast and far out on the sea ice" (Burgess 1984). Observations of radio-collared arctic foxes in the Demarcation Bay area of the ANWR coastal plain indicated that medium-relief, low-center polygon and meadow habitats received use in proportion to their occurrence on the study area. Foxes selected against tussock slope and low-relief, low-center polygon habitats while they selected for gravel beach and high-relief, high-center polygon habitats. The remaining, less common habitats were also selected by foxes (Burgess 1984). In summary, within the area of interest, arctic foxes are distributed across the coastal plain from the U.S.-Canada border westward to the Sagavanirktok River, and most commonly available habitats within the region are used by these foxes.

Estimates of arctic fox abundance are difficult to obtain. Burgess (1984) reported minimum home range sizes of 23.9 km² and 18.5 km² for two female foxes near Demarcation Bay. A mean home range size of 20.8 km² has been reported for the Prudhoe Bay area (Burgess 1984). Fine (1980) observed at Prudhoe Bay that "at least 26 dens occurred in approximately 390 km², an average of one den per 15 km²." Fifty percent of these dens "had pups present sometime during the summer" of observation. Eberhardt (1977) reported a mean distance of 7.1 km between occupied arctic fox dens in the Prudhoe Bay and lower Sagavanirktok River areas. Macpherson (1969) found a mean density of one den per 36 km² in the Aberdeen Lake area of the Canadian Northwest Territory. None of the preceding indicators of density provide direct estimates of arctic fox abundance in the 1002 study area or on the coastal plain between the Canning and Sagavanirktok rivers. In addition, arctic fox numbers may fluctuate by a factor of ten between consecutive years (Underwood and Mosher 1982), which limits the usefulness of single-year data. Nevertheless, we may assume that arctic foxes are moderately abundant on the arctic coastal plain between Prudhoe Bay and the U.S.-Canada border.

Areas of Special Concern

Foxes, like other terrestrial carnivores exhibit considerable mobility. Accounts of movements up to 1,120 km in a two-year period exist for arctic fox, and migrations over hundreds of kilometers have been recorded for this species in the USSR (Underwood and Mosher 1982). In spite of this mobility, denning and rearing of young is a life function for which foxes have specific habitat requirements and are constrained in their movements.

Red Fox

Literature accounts of red fox reproduction state that breeding occurs from December to March with a 52-day gestation period (Samuel and Nelson 1982). In northern Alaska, red foxes complete den selection by early May. Dens in the Sagavanirktok drainage were located in small mounds on river terraces, in river banks, and "in the edges of ravines which faced the river valley"; were characterized by tall willow cover; and were excavated in fine to medium sand or silty loam soil (Eberhardt 1977). Eberhardt (1977) concluded that den sites for red foxes were numerous in the foothills portion of the Sagavanirktok River drainage. The abundance of potential den sites in drainages to the east of the Sagavanirktok is not known.

Red fox pups begin walking at three weeks of age and do not leave the den site (unless moved by the parents) for the first month of life. Unaccompanied movements of pups away from the den site begin at 10 weeks of age and become much longer after 12 weeks of age. Juvenile dispersal of first-year foxes begins in September and October (Samuel and Nelson 1982). Based on the preceding discussion, it appears that denning red foxes (parents and offspring) have limited mobility during the months of May through July and thus may be more sensitive to disturbance than during other portions of the year.

Arctic Fox

Breeding in arctic foxes occurs March through April and gestation takes 52 days (Chesemore 1967, Burgess 1984). Eberhardt (1977) noted that den selection by arctic foxes in the Prudhoe Bay and lower Sagavanirktok River area was "apparently complete by early May." Arctic fox dens in these areas were excavated in pingos, low ridges, sand dunes, and river terraces. Soil at den sites ranged from fine to coarse sand as well as stones, silt, and loam. Arctic fox den sites supported much more grassy cover than surrounding terrain; den vegetation was generally less tall and lush than that associated with the dens of red foxes. Most arctic fox dens in Eberhardt's (1977) study area were classified as "mature" indicating repeated use, perhaps resulting from scarcity of suitable den locations. Chesemore (1967) concluded that a minimum mound height of one meter was necessary for successful den excavation, and 49 of the 50 dens examined by this author were in mounds from one to four meters high. The abundance of potential den sites for arctic foxes in the 1002 study area and westward to the Sagavanirktok River is unknown.

Arctic fox pups have been observed outside their den at three to four weeks of age (Eberhardt 1977), but do not spend much time there until they are more than eight weeks old (Fine 1980). At 11 weeks of age, arctic fox pups spend little time within the den. Periodic visits to the den site occur through August (Fine 1980), but by late summer juveniles disperse from the natal den (Burgess 1984). Based on the preceding discussion, it appears that denning arctic foxes, like red foxes, have limited mobility during the months of May through July and thus may be more sensitive to disturbance than during the remainder of the year.

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POLAR BEAR

Distribution and Abundance

Unless otherwise noted, the following discussion has been abstracted from the Alaska Habitat Management Guide for the Arctic Region (ADFG 1986) or USFWS 1982.

Polar bears (Ursus maritimus) are found in and adjacent to the ANWR 1002 study area, but precise abundance and distribution data are not available. These bears belong to the northern Alaska population, which extends westward to approximately Point Lay. In 1978, this population was estimated to consist of 2500 to 3000 animals. Mark and recapture studies are currently underway to better define the population limits and abundance of Alaskan polar bears.

Except for some denning females, Alaskan polar bears remain associated with sea ice throughout the year, unless they are attracted onshore by carrion. Polar bears are most abundant in drifting pack ice where they feed on ringed seals, their primary food source. Polar bears are found in the ANWR vicinity from fall through spring in association with the sea ice and within 40 km inland from the Beaufort Sea. Bears also may be present during the summer depending on the location of the sea ice relative to the coastline. Shorefast ice is used as a travel route by some pregnant females in September or October as they move to denning sites on land. A high but unknown percentage of the pregnant females den on the sea ice. Other members of the population travel across the shorefast ice when attracted to carrion on land or on the barrier islands. Female polar bears den in October and November, and cubs are born in December or January. The sow and cubs emerge from the den in March or April, remain near the den for one to two weeks, then move onto the shorefast ice zone where they feed on ringed seals.

Areas of Special Concern

The onshore polar bear denning habitat in the ANWR region merits special concern. The main habitat requirement for a maternal den site is snow of sufficient depth for den excavation and protected enough to remain in place during the denning period. Drainages and cut banks provide the best den site locations because adequate snow accumulations occur in conjunction with these topographic features. Of 35 maternity dens found onshore in Alaska by reasearchers, seven were on land within the ANWR study area. Three confirmed dens and two possible dens also were found just north of the ANWR on the shorefast ice. The locations of these den sites are identified in the USFWS's 1982 Section

1002 report. Additionally, six drainages with good to excellent potential denning habitat were identified, including the Katakturuk, Anjun, Okerokovik, and Jago rivers and Carter and Marsh creeks.

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BROWN BEAR

Distribution and Abundance

Unless otherwise noted, the following discussion has been abstracted from the ADFG 1986 or USFWS 1982.

Precise population estimates are not available for brown bears (Ursus arctos) inhabiting the ANWR 1002 study area. However, between 1982 and 1984, 103 brown bears were captured and marked on the coastal plain, adjacent foothills, and in the mountains of northeastern ANWR (DOI 1985). The age structure of the captured bears suggests that the population is stable or increasing (ibid).

Detailed studies of brown bears that seasonally occupy the ANWR coastal plain have not been conducted. General observations indicate that brown bears move to the coastal plain in late May or early June, with the majority of sightings occurring during June and July. Bear sightings are common in the foothills extending from south of Barter Island west into Canada. The highest number of sightings has usually been in the area between the Aichilik River and the Canadian border.

Habitat use patterns are seasonal and begin each year when bears emerge from their winter dens. Adult males emerge first in mid-April while females with new cubs often remain in dens until mid-May. Preliminary data indicate that brown bears move from denning areas in the foothills and mountains south of the ANWR to the coastal plain in June and early July. This timing coincides with the presence of calving and post-calving caribou, and observations suggest that caribou are an important food source for the ANWR brown bears. In October and November the bears again move south into the foothills and mountains to den. Only two bears in 1983 and two bears in 1984 denned in the 1002 study area. The locations of the 1984 den sites are identified in the DOI's 1985 1002 study report.

Areas of Special Concern

River drainages in the coastal plain appear to play an important role in seasonal movements of brown bear. Upon emerging from their dens, bears tend to move downstream through major river drainages. Early emergent vegetation and carrion appear to be important food sources during the spring period. During the summer months, many bears move out of the river drainages to forage in upland areas. In fall, bears move back into the river valleys and travel upstream to denning areas. River drainages appear to provide both a travel corridor and important spring and fall foraging habitat for brown bears.

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RINGED SEAL (Phoca hispida hispida)

Distribution and Abundance

Unless otherwise noted, the following discussion has been abstracted from ADF&G 1986 and USFWS 1982.

Ringed seals occur along the arctic and subarctic coasts of North America. Because they are associated with ice year-round, the seasonal ice cycle has an important effect on their distribution and regional abundance. Within the 1002 study area, ringed seals are found in waters of the ANWR that are claimed by both the federal and state governments. Population estimates for the 1002 study area are not available, however Alaskan waters may contain as many as 1.5 million ringed seals.

Ringed seals are the most ice-adapted of all northern pinnipeds and are the only seals in the Northern Hemisphere that regularly inhabit the fast ice. During the winter and spring, the highest densities of breeding adult seals have been found on stable land-fast ice; subadults are more numerous in adjacent flaw zones.

Ringed seals use open leads and cracks in the ice to surface and breathe during freeze up. As the ice mass solidifies the seals use their claws to actively keep breathing holes open. When drifted snow covers breathing holes, some holes are enlarged and seals haul out and excavate lairs in the snowdrifts. Lairs are used by males and females of all ages for resting and by adult females for pupping. Sufficient snow for lair construction (20 cm) is usually found only to the lee of ice hummocks or along pressure ridges. In flat areas little or no snow accumulates and few lairs are constructed.

During the late spring and early summer, ringed seals haul out on the ice to complete their annual molt. They use the fast ice, as well as relatively large flat floes in the pack ice, and are usually seen near cracks, leads, or holes where they have rapid access to water. Feeding is greatly reduced during the molt and the amount of time spent on the ice increases as the molt season progresses.

In summer, most ringed seals of all age classes and both sexes are found along the edge of the permanent ice pack and near nearshore ice remnants. A small portion of the population, mainly subadults, may be found in ice-free areas. Ringed seals spend most of the summer and early fall in the water feeding intensively. They feed mainly on benthic and pelagic crustaceans and arctic cod.

Areas of Special Concern

Most of the lagoons in the ANWR study area are shallow and winter ice is usually anchored to the bottom. Therefore, they are not available to ringed seals as pupping or winter feeding habitat. Lagoons must be deeper than 2.5 - 3.0 m and there must be deep water connections with the ocean in order to provide suitable pupping habitat. Lagoons such as Nuvagapak, Angun, and Jago are 3.0 - 3.6 m deep in places, and are open to the ocean. These lagoons may provide suitable pupping and winter feeding habitat and should receive special consideration.

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STEVE COWPER
GOVERNOR

STATE OF ALASKA
OFFICE OF THE GOVERNOR
JUNEAU

February 6, 1987

The Honorable Donald P. Hodel
Secretary
Department of the Interior
Interior Building, Room 6151
C Street between Eighteenth
  and Nineteenth Streets, NW
Washington, DC 20240

Dear Mr. Secretary:

I wish to take this opportunity to thank you for providing the state with the additional two weeks to review and comment on the draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment. The additional time enabled us to conduct a more thorough and useful review of this important document. Enclosed is a copy of the state's comments on the draft assessment.

Like you, I feel it is extremely important that Congress be persuaded to open the coastal plain to oil and gas leasing consistent with the purposes of the refuge to preserve its fish and wildlife values. The state is committed to this objective and with your cooperation will work to see that it is accomplished. I look forward to reviewing the final report to Congress and hope to meet with you in the near future to discuss how we might best advance a cooperative effort to move forward with oil and gas leasing in the Arctic National Wildlife Refuge.

Sincerely,

Steve Cowper
Governor

Enclosure

cc/enc: Senator Ted Stevens
Senator Frank Murkowski
Representative Don Young
William Horn, Department of
the Interior, Washington, DC
John Katz, Office of the
Governor, Washington, DC
Alaska Senate Resources Committee
Alaska House Resources Committee

STATE OF ALASKA

OFFICE OF THE GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET
DIVISION OF GOVERNMENTAL COORDINATION

STEVE COWPER, GOVERNOR

CENTRAL OFFICE
P.O. BOX AW
JUNEAU, ALASKA 99811-0165
PHONE: (907) 465-3562

SOUTHEAST REGIONAL OFFICE
431 NORTH FRANKLIN
P.O. BOX AW SUITE 101
JUNEAU, ALASKA 99811-0165
PHONE: (907) 465-3562

SOUTHCENTRAL REGIONAL OFFICE
2600 DENALI STREET
SUITE 700
ANCHORAGE, ALASKA 99503-2798
PHONE: (907) 274-1581

NORTHERN REGIONAL OFFICE
675 SEVENTH AVENUE
STATION H
FAIRBANKS, ALASKA 99701-4596
PHONE: (907) 456-3084

February 6, 1987

Mr. Robert Gilmore
Regional Director
U.S. Department of the Interior
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

Dear Mr. Gilmore:

The state has reviewed the Draft Arctic National Wildlife Refuge (ANWR), Alaska, Coastal Plain Resource Assessment 1002(h) Report. We appreciate the additional time granted the state to review this important report. Based on our review of the substantial amount of information contained in the draft 1002(h) report, we strongly support the conclusion that oil and gas exploration be allowed in ANWR consistent with the chief purpose of the refuge to preserve its unique wildlife values.

The State of Alaska recommends that Congress immediately open the 1002 area to oil and gas leasing, with the exception of the area described by U.S. Fish and Wildlife Service (USFWS) as the "core" caribou calving area. The state strongly recommends that leasing in the "core" calving area be deferred for a ten-year period. During this ten-year period, the Department of the Interior (DOI) should establish an ANWR Caribou Impact Assessment Study Group composed of federal, state, university, and private researchers to further study the potential impacts of oil and gas activities in the calving area on the Porcupine Caribou Herd. The study should be conducted over a seven-year period following commencement of the first exploratory well and result in a report to the Secretary of the Interior and Governor of Alaska. The report would seek to document the biological importance of the core calving area, the effects of oil and gas activities in the 1002 area on the Porcupine Caribou Herd, and the effectiveness of mitigation measures employed in the 1002 area to minimize adverse impacts to caribou. Based on the report findings, the Governor and Secretary would recommend to Congress to extend the deferral or open the core calving area to oil and gas leasing. If

Congress failed to act on the recommendations within the ten-year period, the recommendation of the Secretary and Governor would be implemented.

It is imperative that the recommendations from the Governor of Alaska be included with those of the Secretary of the Interior given the significant interests of the state involved in both the leasing and protection of resources in the 1002 area. Not only is the state a sovereign steward of natural resources with regulatory responsibilities in the area, it is the principle owner of lands which any ANWR production transportation system must cross.

This recommendation is based on several salient facts. First, Congress has mandated that fish and wildlife populations in ANWR receive a very high level of protection. Because of this mandate, USFWS is required to take a conservative approach when making decisions regarding the impact of development activity on the refuge's fish and wildlife populations. Second, while a sizable amount of information has been collected on the impact of oil and gas activity on the Central Arctic Caribou Herd, questions remain regarding the potential impact of the oil and gas activity on the Porcupine Caribou Herd population because of its larger size, distribution and movement patterns, and population dynamics. Contrary to the statements made on page 112 of the draft 1002(h) report, at this point in time there is inadequate information to predict what population impacts would occur if oil and gas development were to take place in the core calving area. Third, protection of the herd and its habitat is of great concern to our Canadian neighbors, and the deferral and studies will respect those concerns.

Special Values of ANWR

We predicated our review on two fundamental facts inherent to ANWR. First, the fish and wildlife resources of ANWR are of significant state, national, and international importance. The Porcupine Caribou Herd, which numbers some 180,000 animals, annually migrates between Canada's Northwest Territories and Alaska's arctic coastal plain where it spends a portion of each summer. These animals are of great importance to both the people of Alaska and Canada. The Porcupine Caribou Herd and other fish and wildlife of the ANWR coastal plain are the foundation of the subsistence way of life to the residents of Kaktovik, Arctic Village, Venetie, and Fort Yukon in Alaska and Old Crow in the Yukon Territory of Canada. Furthermore, within the refuge, "The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge." (Draft 1002(h) report, page 46.) The Alaska Department of Fish and Game has conducted an extensive review of ANWR fish and wildlife information which is available on request to USFWS and other interested parties. The department's data on distribution and abundance of fish and wildlife and areas of special concern confirm the great importance of ANWR's renewable resource base.

The second intrinsic feature of ANWR is that it has high oil and gas potential. The state concurs with the draft 1002(h) report findings on page 1 that the 1002 area, ". . . is clearly the most outstanding oil and gas frontier remaining in the United States, and could contribute substantially to domestic energy supplies." As you know, the Alaska Department of Natural Resources has recently made public a preliminary appraisal it conducted of petroleum resource potential in ANWR's coastal plain. Alaska's report confirms DOI's conclusion that ANWR's coastal plain has the potential for an unusually large accumulation of oil.

Past Lessons Learned from Oil and Gas Activities in Alaska

As indicated in the draft 1002(h) report, development of ANWR's coastal plain will alter the existing environment and to some degree affect the Porcupine Caribou Herd. It is critical that appropriate and effective measures be taken to minimize the potential adverse effects of oil and gas activities on ANWR's coastal plain. Alaska has nearly two decades of experience in dealing with oil exploration, and lessons of the past will serve as a guideline for development in the future. In the event Congress permits exploration, the state would encourage that the best and latest technology be used.

The state assumes the draft 1002(h) report was not intended to be all inclusive, and that more detailed performance standards would be developed in concert with the state prior to any lease sales or any transfer of subsurface rights. Clearly, additional time will be needed in order to develop an adequate set of terms and conditions designed to ensure protection of air and water quality and fish and wildlife resources. With this understanding, our general comments on the proposed mitigation measures summarized in the draft 1002(h) report are included in Enclosure A.

Federal/State Consultation and Resolution of Issues

The state is encouraged to read on page 97 of the 1002(h
that "The FWS would emphasize early and continuous cons
and coordination with leaseholders, permittees, and st
federal agencies at the start of planning." Consist
federal intent, the state feels it is essential tha
lish a formal consultation process with the state
parties in order to clearly establish at what poi
process and what level of detail different issu
will be addressed. This process would also al
for the parties to clarify their respective a

permitting, and field procedures to avoid duplication or conflicting efforts. These consultations should identify or acknowledge existing regulatory requirements and authorizations at federal, state, and local levels. At a minimum, it should address different agencies' review times and public notice requirements. Issues that should be addressed are the timing of the various phases of review for specific projects; the level of detail to be addressed at each; and the coordination of permitting, review of plans of operations, field surveillance, and field approvals. Experiences associated with the development of the Trans-Alaska Pipeline System (TAPS) and the proposed Alaska Natural Gas Transportation System (ANGTS) from Prudhoe Bay to the Canadian border could provide useful models for cooperative management programs.

A coordinated interagency process for planning, design review, permitting, field surveillance, compliance and enforcement, and reclamation would serve the state, DOI, and industry well. The state's existing coastal management consistency process as well as the jurisdiction of state agencies such as the Departments of Fish and Game, Environmental Conservation, Natural Resources and the Alaska Oil and Gas Conservation Commission need to be acknowledged and effectively implemented in the review and permitting of each stage of the overall project. Lack of sufficient and effective coordination could lead to each agency dealing independently with applicants and could result in permitting inefficiencies with duplicative and inconsistent compliance and enforcement actions.

Topics Needing Further Discussion in the Final 1002(h) Report

Overall, the State finds that USFWS did an excellent job in compiling and summarizing a large amount of biological and geological information in the draft 1002(h) report. Considerably more work needs to be directed to the following eight issues of major importance to the state.

1. Standards for Air and Water Quality Protection

The draft 1002(h) document focuses primarily on a discussion of habitat and wildlife issues and petroleum potential. The document is considerably weaker with respect to air, land, and water quality issues. DOI must acknowledge and accurately reflect in the final 1002(h) report state authority in this area and the body of regulations and requirements associated with sound environmental practices. A list of pertinent state authorities is included in Enclosure B for your reference.

a) Air Quality Management

Particular attention should be paid to emissions associated with start-up and upset flaring, emissions of nitrogen oxides, and the best available technology review process associated with "prevention of significant deterioration" review.

b) Drilling Wastes and Solid Waste Management

Major waste streams include garbage, drilling wastes, metal wastes, and oily wastes. Our experiences on the north slope verify that it is very important that proper management of all these wastes be addressed from the beginning.

Drilling wastes are of particular concern. Improper management of drilling wastes can result in the contamination of adjacent habitats with potential negative effects to the vegetation and fish and wildlife species. Management of drilling wastes should involve development of best practices to minimize waste generation and to ensure total containment or injection of all produced wastes. Best practices should be based in part on a thorough evaluation of the effectiveness of past practices of drilling waste disposal in Alaska. Recent efforts by the Alaska Department of Environmental Conservation to develop a workable set of regulations governing these activities are nearing completion and should be viewed as the framework for developing specific requirements. In addition, the U.S. Environmental Protection Agency is currently studying the issue of proper drilling waste disposal and should soon have a report available.

Provisions for pickup of windblown litter and other debris must be addressed by stipulation. Early planning for sound disposal of each waste stream will lead to the best environmental results.

c) Liquid Waste Management

Possible liquid waste discharges include domestic wastewater, reserve pit fluids, produced water discharges, hydrostatic test discharges, vessel rinsates and radiographic wastes. Each needs to be identified and provisions made for proper disposal. The existing local, state and federal regulatory structure, ranging from plan review to the use of the best practicable technology, needs to be addressed. Reinjection of produced waters and non Resource Conservation and Recovery Act (RCRA) regulated liquid wastes is routinely practiced on state lands on the north slope.

d) Hazardous Waste Management

No discussion of hazardous waste management is included in the draft 1002(h) report. Hazardous waste management is governed by stringent requirements under the federal RCRA. Transportation of hazardous materials is regulated by the federal Department of Transportation. Proper management must be addressed.

e) Oil Spill Prevention and Response

The draft 1002(h) report refers to the need to address oil spill control requirements at page 84. More detailed plans will be required under the cited state and federal statutes. Provision for a coordinated response capability should be provided by stipulation.

2. Provisions for Offshore Support Facilities

It is important that the final 1002(h) report and management alternatives address the siting in ANWR of oil and gas facilities needed to support offshore oil and gas development occurring adjacent to ANWR on state-owned submerged lands and on the federal Outer Continental Shelf. As written, none of the alternatives specifically state that support facilities, if needed, would be permitted.

3. Alternative Development and Transportation Scenarios

Statements in the draft 1002(h) report refer to a transportation corridor (road and pipeline) between ANWR and TAPS Pump Station 1 in Prudhoe Bay. The state recognizes that the scenario which was analyzed is only one of many potential alternatives. The actual alignment of transportation facilities if, in fact, discoveries are made and any facilities are required, will be dependent upon many factors including the location and size of any reserves discovered, the need to accommodate delivery of any additional nearby reserves, terrain constraints, habitat considerations, and project economics. We suggest that the final report reflect the interrelationship of these factors in determing the size and location of needed transportation facilities. In addition, we suggest that the report describe the level of any review that will proceed these decisions. Interagency and public reviews of TAPS and ANGTS projects provide a good model of the scope of analysis which accompanies the review and approval of a major transportation project.

4. Subsistence ANILCA 810 Analysis

The draft 1002(h) report does not address the process by which the impacts of oil and gas development on subsistence activities will be identified and mitigated. Such an analysis is required by Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA).

Impacts of oil and gas activity in the 1002 area on fish and wildlife resources can adversely affect human uses of these resources. This is true both in the 1002 area and in other Canadian and Alaskan communities that rely on wildlife which use the 1002 area, most notably the Porcupine Caribou Herd. The draft 1002(h) report does not present a complete picture of subsistence uses in the area. The discussion focuses principally on subsistence uses in the community of Kaktovik, and makes only passing reference to some but not all other communities that use the Porcupine Caribou Herd. A more comprehensive discussion of subsistence uses by communities that use Porcupine Caribou Herd is required in order to better assess the future impacts of development in the coastal plain. The potential impacts associated with oil and gas exploration and development in the 1002 area, like the siting and design of transportation facilities, cannot be addressed with certainty until exploration has confirmed the existence and location of potential oil and gas fields and some understanding of the scope of development is known. Enclosure C describes the basic requirements of ANILCA 810, and provides a recommended approach for meeting these requirements.

5. Water Availability and Use

The draft 1002(h) report correctly notes that water resources in the 1002 area are very limited and confined to the surface. Most of these water sources freeze solid by late winter. Given the paucity of fresh water for industrial use within the 1002 area, the draft report concludes that adjacent marine waters must be viewed as a water resource. Little attention is given to other alternatives used elsewhere on the north slope, such as snow melters and deep thaw lake reservoirs.

Fresh water for use in the Prudhoe Bay oilfield was taken from the Sagavanirktok River adjacent to the Deadhorse industrial area during the early years of that field's development. This removal of water from the Sagavanirktok River resulted in dewatering of fish overwintering habitats with documented mortality of large numbers of fish. As a consequence, the state no longer allows the use of water from this and similar sources. Currently, in order to provide fresh water for industrial uses in the Prudhoe Bay area, the state requires the use of several large surface water reservoirs that have been developed. The majority of these reservoir sites are depleted deep gravel mine sites that have been flooded with surface water. Other sites are shallow tundra lakes that have been deepened to provide winter water supplies. These water reservoirs are filled either passively or actively from nearby drainages during the spring breakup period and are, in general, isolated from river and stream systems during the remainder of the year. DOI should initiate a more thorough analysis of similar alternatives for industrial water use in the 1002 area.

6. Gravel Use

Gravel sites in ANWR should be sited, developed, and reclaimed in such a manner that overall impacts to water quality and fish and wildlife resources are mitigated. Plans for gravel removal should include detailed plans for the reclamation of the site to be conducted in phases concurrent with the removal of gravel. Gravel sites may also be developed in such a manner that they can be used as water sources for both exploration and development.

7. Disputed Acreage

Although the draft report references the submerged lands ownership dispute between the state and federal government regarding the coastal lagoons between the mainland and offshore barrier islands, it does not address the ownership status of the beds of nontidal navigable waters. The state asserts ownership of the submerged lands underlying the Aichilik, Jago, Okpilak, Hulahula, Sadlerochit, Staines, and Canning rivers within the 1002 area.

8. Decision Rules and Mitigation Policy

The terms "avoidable adverse impacts" and "unnecessary adverse effects" are not defined and do not appear in USFWS Mitigation Policy (Federal Register, Vol. 46, No. 15). Adding further to the confusion is a list of "unavoidable effects" on page 101 that includes a mix of those that are truely unavoidable (e.g., loss of habitat by gravel overlay for roads and pads) with many that are avoidable with proper design (e.g., erosion and ponding along roads, water storage pits in streambeds).

There also appear to be discrepancies between the explanation regarding Resource Category 1 and 2 in the draft 1002(h) report and the explanation for both of these categories in the federal mitigation policy regulations. Further, the draft 1002(h) report makes no mention of the requirement for "no significant adverse affect" as provided under Section 1002(h) of ANILCA. DOI should address these apparent inconsistencies with USFWS mitigation policy in the final 1002(h) report.

As discussed earlier in our comments, the Alaska Coastal Management Program standards and review procedures need to be addressed in the final 1002(h) report. In particular, reference should be made to the Habitat Standard (6 AAC 80.130) which requires habitats to be managed so as to maintain or enhance their characteristics and that uses and activities which will not conform to this standard may be allowed if there is a significant public need and there is no feasible and prudent alternative to meet the public need.

Conclusion

Recognizing the important renewable and nonrenewable resource values found in ANWR, the state fully supports the opening of the coastal plain to oil and gas leasing subject to appropriate and effective mitigation based on our firm belief that exploration, development, and production can occur in a manner consistent with the established purposes of ANWR. We look forward to reviewing the final 1002(h) report and actively pursuing a joint consultation process in the near future to resolve specific aspects of concern to the State of Alaska.

Sincerely,

Robert L. Grogan
Director

Enclosure

cc: Lieutenant Governor Steve McAlpine
Commissioner Don Collinsworth, DFG, Juneau
Commissioner Judy Brady, DNR, Juneau
Commissioner Dennis Kelso, DEC, Juneau
John Katz, Office of the Governor, Washington DC
Rod Swope, Office of the Governor, Juneau
Mayor George Ahmaogak, North Slope Borough, Barrow
Mayor Loren Ahlers, Kaktovik

ENCLOSURE A
State Comments on Summary of Recommended Mitigation for the 1002 Area

The following comments are provided within the context of the federally proposed stipulation package summarized on pages 145-147 of the draft 1002(h) report. Our comments represent the state's position in response to the specific federal proposal and do not represent the state's total concern regarding mitigation requirements. The state reserves the right to comment further on stipulations not yet included or discussed with DOI. In addition to the following major comments on the specific stipulations, there are a number of terms and conditions which should be added.

First, there are mitigative measures for certain "non evaluation" species mentioned in the species discussions in the "Environmental Consequences" chapter of the draft 1002(h) report that are not contained in the summary section. These mitigative measures should be added to the summary section. Second, there are a number of factors which are either not addressed or not handled in sufficient detail in order to provide for an overall effective mitigation program. Examples include the following: coordinated state/federal process for design review, permitting, field surveillance, compliance, and enforcement; rehabilitation; maintenance of public fish and wildlife resource use; material exploration, extraction, and rehabilitation; solid waste management; timing restrictions on activities, and setbacks required for the use of explosives; liquid waste management; hazardous waste management; stream crossings and fish passage; water management; bonding and financial responsibility; right of access; erosion control; oil spill contingency planning; penalty provisions for non-compliance; definitions of key terms; identification of information needs; design criteria and compliance plans; quality assurance/quality control; air quality; and support service industries. These subjects need to be addressed in a comprehensive manner and appropriate mitigative measures described.

In addition, the DOI stipulations do not clearly differentiate between stipulations or restrictions applied to exploration versus development. The state suggests that the DOI reorganize the entire mitigation section into two distinct components: exploration, and development. Implementation of the stipulations should be tied to the type of activity proposed. Stipulations referring to area specific closures may be effective forms of mitigation during exploratory activities but may be ineffective or inappropriate during development. For example, the stipulation on no activity within 1/2 mile of a documented polar bear den could be useful and effective during exploration, but it is unclear how it would be implemented during development when facilities are fixed and certain activity levels are required. There are other stipulations that fall into a similar category and clarification is needed in order to interpret how and when they will be used and implemented.

Stipulation 1 - Sensitive Habitats and Species:

As written it is unclear how this stipulation would be enforced. DOI should define what is included in the term "non essential facilities."

Stipulation 2 - Road and Drainage Designs:

Roads and other facilities should be designed, constructed, and maintained in such a manner that the following performance standards are achieved: natural drainage is maintained; free passage of fish is provided; gravel fills are stable; upslope ponding and downslope dewatering is prevented; the number of stream crossings is minimized; natural floodplains and flow patterns are maintained; spring areas are avoided; and road alignments are perpendicular to stream flows and sited in areas of minimal floodplain width. Design criteria and specifications to satisfy these performance standards should be developed by the industry and should be approved by the appropriate federal and state agencies.

Stipulation 3 - Exploration Pad Construction:

The state strongly supports the objective of this stipulation to minimize gravel requirements for exploration activities.

Stipulation 4 - Rehabilitation Plan:

The need for rehabilitation plans is clear, but the timing of their submittal and definition of measures necessary to ensure that they will be implemented needs further consideration. Separate rehabilitation plans for exploration and development, including abandonment should be required. Also, requirements for conducting necessary research to develop techniques and measures for the rehabilitation of specific sites (e.g., gravel pads, seismic lines, material sites, etc.) should be addressed.

Stipulation 5 - Off-Road vehicles:

should be modified to prohibit off-road vehicle use, except for travel by snowmachines, unless otherwise specifically permitted.

Stipulation 6 - Limits on Oil Exploration:

While we agree in principle with this stipulation, as written it may be too restrictive. Exploration includes both surface disturbing and non surface disturbing activities. The stipulation should limit any surface disturbance activities to the winter months and allow only non surface disturbing activities during the summer, provided there are no area or timing restrictions that would dictate otherwise.

Stipulation 7 - Gravel and Water Removal:

The state recommends that DOI address gravel removal and water removal separately. In addition, DOI should prohibit winter water removal from fish-bearing waters, springs and tributaries. We also recommend that DOI modify summer/fall water removal language to read: "During summer and fall, water removal shall be restricted to those operations that will maintain instream flows at levels necessary to provide optimum fish passage and rearing habitat, and water quality. In addition, large surface water reservoirs should be created to provide an adequate supply of fresh water for oil and gas related industrial activity." Deep pit type excavations adjacent to active channels of the streams identified as lacking suitable fish overwintering habitat could provide a winter water source and provide overwintering fish habitat. These reservoir sites should incorporate features that will enhance their value as fish and wildlife habitat (e.g., areas of shallow water, varying shoreline, provide for free movement of fish in and out of sites).

With respect to gravel removal, prohibit removal in all fall spawning fish and overwintering areas. Additionally, prohibit gravel removal from all fish-bearing rivers/streams unless approved on site-specific basis. Plans for gravel removal should include detailed plans for the rehabilitation of the site and rehabilitation must be conducted in phases concurrent with the removal of gravel. The importance of rehabilitation cannot be overemphasized. At a minimum, any gravel site, whether upland and/or floodplain, should be sited and designed to conform to the guidelines as defined in the Gravel Removal Guidelines Manual for Arctic and Subarctic Floodplains (USFWS, Woodward-Clyde Consultants, 1980).

Stipulation 8 - Pipeline Elevation:

We recommend this stipulation be modified by adding a general statement of intent and then incorporate stipulations 8 thru 11 under that statement, and add an additional item regarding traffic control. Suggested language is as follows:

(a) Include language as proposed in stipulation No. 9.

(b) Include language as proposed in stipulation No. 10 except pipelines should be buried where "feasible and prudent" not just where "possible."

(c) Roads and pipelines should be separated. Offset distances shall be optimum for preventing the synergistic effect of roads and pipelines on caribou movement, based on most current relevant research.

(d) A surface traffic control plan should be prepared, approved by the Regional Director, and implemented. The plan should consider such measures as convoying, pulsed traffic, and seasonal or daily restrictions.

Stipulation 12 - Restrict Surface Occupancy within 3 Miles of Coastline:

The blanket 3-mile buffer for facilities adjacent to the coast is too stringent as written. Provisions must be made to allow drill pads, flow stations, and other essential support facilities for offshore development, in this buffer strip. In addition, measures must be taken to ensure free passage of caribou along the coast. Criteria must be established to determine which facilities will be allowed in the buffer area.

Stipulation 13 - Monitoring and Research Requirements:

Modify to make two separate terms. One that states: "The DOI should be responsible for ensuring appropriate monitoring of populations, productivity, movements, and general health of key species in relation to overall oil and gas activities in ANWR." Then add a separate requirement to read: Where there is a possibility that an activity could adversely affect fish and wildlife, "Lessees and permittees may be required to monitor the impacts of the activity on selected species, their habitats, and human uses; to evaluate impact hypotheses and the effectiveness of specific mitigation measures employed; and to develop corrective actions, including improved mitigative techniques, as necessary."

Stipulation 14 - Watercourse Setbacks:

The blanket 3/4-mile buffer for all permanent facilities is too stringent as written. Provisions must be made to allow drill pads, flow stations, and other essential facilities within this 3/4-mile buffer. Criteria must be established to determine which facilities will be allowed in the buffer area.

Stipulation 15 thru 18 - Peregrine Falcon and other Raptors Protection:

The state concurs with the need for special protection for the peregrine falcon, however, stipulations should be modified to incorporate language developed by the federal peregrine falcon recovery team. In addition, the same level of protection provided to the endangered peregrine falcon should not be provided to all raptors.

Stipulation 19 - Polar Bears:

This stipulation should be expanded to require an annual fall monitoring program to follow bears moving ashore and identify den site locations.

Stipulation 20 - Construction Near Coastal Bluffs:

Support language as proposed.

Stipulation 21 - Discharge of Firearms:

Restrictions on the discharge of firearms in the vicinity of structures is necessary to protect human safety and oil field operations, however, the five-mile prohibition may be excessive. Further discussion is needed on the subject and the potential effects on human use of resources in the 1002 area.

Stipulation 22 - Prohibit Surface Occupancy in Sadlerochit Spring Special Area:

In addition to the Sadlerochit Spring Special Area, surface occupancy should be prohibited in the area within 1/2 mile of the Fish Hole No. 1 spring outlet located in the Hulahula River, and extend for 1/4 mile on either side of mean high water for a distance of 3 miles downstream of the outlet.

Stipulation 23 - Protection of Thaspi arcticum:

It is not known how widespread this plant is, so it is impossible to determine how large an area will be placed off limits by this stipulation. Until the plant is placed on the endangered species list and more is known regarding its areal extent, it is premature to impose such a restriction.

Stipulation 24 - Causeways:

Based on the state's case-by-case review and experience in authorizing the Westdock, Endicott and Lisburne causeways, we recommend that the proposed stipulation be revised such that the construction of docks and causeways minimize nearshore hydrographic changes and avoid significant adverse effects on fish populations and movements.

Stipulation 25 - Time and Area Closures for Wildlife:

Although the state generally supports the language as proposed, it should be made clear that the stipulation applies only to exploratory activities, vehicle movements, and other activities that can reasonably be rescheduled for another period of time.

Stipulation 26 - Overflight Restrictions:

Expand to include aircraft overflight restriction above barrier islands, lagoons, river deltas, and wetlands within one mile of coast between May 15 and September 30 (excluding take-offs and landings). Also make clear that human safety takes precedence over the restrictions.

Stipulation 27 - Reduction of Human/Bear Conflicts:

Modify to read, "Measures must be taken to minimize human/bear interaction and conflict. These measures may include, but not be limited to, the use of bear-proof fencing around certain facilities, special solid waste management plans (such as incineration of putrescible wastes), and employee education programs."

Stipulation 28 - Limit Use of Infrastructure to Official Business:

Support language as proposed.

Stipulation 29 - Inventory Areas for Cultural Resources:

Support language as proposed.

Stipulation 30 and 31 - Air and Water Quality Provisions:

As discussed in our cover letter, the proposed stipulations represent a very small step toward defining what will be needed to provide an appropriate level of air and water quality protection as leasing moves forward. Further consultation between DOI and the state is needed on this subject to jointly develop a workable package of specific measures. Such a process would better acquaint DOI with the extensive body of environmental regulation and provide appropriate forums for decisions about stipulations, plans of operations, and permits. It is crucial to ensure that exploration and development is conducted in accordance with environmental standards appropriate for the coastal plain of ANWR.

Stipulation 32 - Environmental Orientation Programs:

Support the language as proposed.

Enclosure A/kfi

ENCLOSURE B

SUMMARY OF MAJOR STATE AUTHORITIES PERTINENT TO ANWR

The State of Alaska defines and regulates the following:

	Program	Statutes	Definitions	Regulations	Definitions
1)	SOLID WASTE	AS 46.03.100-120 800-810	AS 46.03.900(24)	18 AAC 60 (draft)	18 AAC 60.910(49)
	Construction Waste				(Not defined)
	Industrial Waste		AS 46.03.900(10)		-- --
	Other Wastes		AS 46.03.900(16)		-- --
	"Drilling Wastes"		AS 46.03.900(31-32)		18 AAC 60.910(16)
	Putrescrible Waste		-- --		18 AAC 60.910(40)
	Septage, Sewage Sludge Sludge		-- --		18 AAC 60.910(46) to (48)
	Sanitary Waste		-- --		-- --
2)	LITTER	AS 46.06	AS 46.06.150(4)		
3)	HAZARDOUS	AS 46.03.296-308 830-833	AS 46.03.299(a)-(b)	18 AAC 62	

Enclosure B

	Type of Waste	Statutes	Definitions	Regulations	Definitions
4)	OIL and HAZARDOUS SUBSTANCES*	AS 46.03.740 758-760 780-790 822-826 AS 46.04		18 AAC 20 18 AAC 75	
	Oil		AS 46.03.758(6) AS 46.03.826(4) AS 46.04-120(9) AS 46.08.900(7)		
	Hazardous Substances	AS 46.03.826(3)	AS 46.08.900(6) AS 46.09.900(4)		
5)	WASTEWATER	AS 46.03.100-120		18 AAC 72	
	Domestic Wastewater		-- --		18 AAC 72.990(16)
	Graywater		-- --		18 AAC 72.990(24)
	Non-domestic Wastewater		-- --		18 AAC 72.990(29)
	Other Wastes		-- --		18 AAC 72.990(32)
	Septage		-- --		18 AAC 72.990(44)
	Sludge		-- --		18 AAC 72.990(50)
	Spoils		-- --		18 AAC 72.990(52)

Note new legislation adding AS 46.08, AS 46.09, and amending AS 46.03.745, 758(k), 760(a), 765, 780(a), 790(a) (b) (d) and AS 46.04.010 and 090(b).

Enclosure B

	Type of Waste	Statutes	Definitions	Regulations	Definitions
6)	TOXIC MATERIALS and WASTES are a "special class regulated under the Federal Toxic Substances Control Act and National Emission Standards for Hazardous Air Pollutants.				
7)	HABITAT PROTECTION				
	Fish Habitat Permit	AS 16.05.840 AS 16.05.870	-- --		
8)	COASTAL MANAGEMENT	AS 46.40		6 AAC 50 6 AAC 80 6 AAC 85	6 AAC 50.190 6 AAC 80.900 6 AAC 85.900
9)	WATER USE	AS 46.15		11 AAC 93	
10)	GRAVEL SALES			11 AAC 76	
	a. Near Shore	AS 38.05.110-120			
	b. Navigable Rivers	AS 38.05.110-120			
11)	PIPELINE RIGHT OF WAY LEASES			11 AAC 80	
	a. Near Shore	AS 38.35			
	b. Navigable Rivers	AS 38.35			
12)	OIL AND GAS LEASES			11 AAC 83	
	a. Near Shore	AS 38.05.180			
	b. Navigable Rivers	AS 38.05.180			

Enclosure B

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Type of Waste	Statutes	Definitions	Regulations	Definitions
13) SURFACE LEASES			11 AAC 62	
a. Near Shore	AS 38.05.070-075			
b. Navigable Rivers	AS 38.05.070-075			
14) LAND USE PERMITS			11 AAC 62	
a. Near Shore	AS 38.05.850			
b. Navigable Rivers	AS 38.05.850			
15) CLASSIFICATION			11 AAC 55	
a. Near Shore	AS 38.04.065-900			
b. Navigable Rivers	AS 38.04.065-900			
16) ACCESS ALONG HISTORIC TRAILS	RS 2477			

Enclosure B/kfi

ENCLOSURE C

A Recommended Approach to Implementation of ANILCA §810

March 14, 1986

§810 of ANILCA requires federal agencies to consider the effects of proposed land actions upon people engaged in subsistence uses. Specifically, it requires agencies to:

1. Evaluate the effects of the proposed action on subsistence uses and needs;
2. Determine the availability of other lands for the purposes sought to be achieved and assess whether other alternatives are available which would reduce or eliminate the use, occupancy or disposition of public lands needed for subsistence purposes;
3. Determine whether the proposed action would "significantly restrict" subsistence uses;
4. If the proposed action would significantly restrict subsistence uses, to:
   - a. Meet certain public notice and hearing requirements.
   - b. Determine that such a restriction meets certain standards, including involving the minimum amount of public lands and minimizing adverse impacts upon subsistence uses and resources.

This paper describes the basic requirements of §810 and provides a systematic approach to meeting these requirements when making a decision on an OCS oil and gas lease sale.

Evaluating Effects on Subsistence Uses

ANILCA §810 provides, as a starting point, that "in determining whether to...lease...public lands...the head of the federal agency having primary jurisdiction over such lands...shall evaluate the effect of such use, occupancy, or disposition...on subsistence uses and needs...."

This section is clearly intended to require a specific assessment of impacts on subsistence uses. An adequate §810 evaluation must include complete and accurate information about the proposed action and about the subsistence uses of potentially affected wild resources.

Information about the wildlife populations, fish stocks, and geographic areas which could be affected by the proposed action are needed to determine the scope of potential effects on subsistence. Information about the specific subsistence uses of, and needs related to, these resources and areas is required to identify and evaluate these effects. This includes data on:

1. Who uses the resources which could be affected;

2. Where, when, and how the resources are harvested;

3. How much they use; and,

4. The significance of the harvested resources for meeting socioeconomic and cultural needs.

Maps of community subsistence use areas can provide valuable data about which communities and groups of people use fish and wildlife that could be affected. Each §810 evaluation should include a map and list of communities that use the stocks and populations of resources potentially affected by a proposed action. The Alaska Department of Fish and Game routinely develops maps of subsistence use as it conducts community subsistence studies. The state welcomes opportunities to cooperate with federal agencies in improving the subsistence data base.

Once the area and communities which could be affected by an action are identified, an assessment must be made of the potential effects of the action on uses of fish and wildlife. The potential linkages between the proposed action, fish and wildlife resources, and subsistence uses need to be clearly described. This can be accomplished through developing hypothetical scenarios, and tracing their implications out through the biological system to the people who rely on subsistence uses.

The evaluation of effects should address potential positive, neutral, and negative effects, as well as direct and indirect impacts on subsistence uses resulting from a proposed lease sale. The guidelines for implementation of §810 developed by the Alaska Land Use Council are helpful in identifying several effects which would restrict subsistence uses:

1. A reduction in subsistence uses due to direct impacts on the resource, adverse impacts on habitat, increased competition for the resources, or other factors;

2. A reduction in the subsistence uses due to changes in availability of resources caused by an alteration in their distribution, migration, or location; and

3. A reduction in subsistence uses due to limitations

on the access to harvestable resources, such as by physical or legal barriers.

An adequate §810 assessment must consider the potential effects of the proposed action in each community which would be affected. In some circumstances, however, it may be necessary to examine effects on the subsistence uses of "typical" communities or groups of people within the affected zone.

Biological and socioeconomic data need to be at a level of detail which will allow a meaningful assessment of potential impacts on the people who use resources for subsistence. These effects can occur at the individual, household, community and regional level.

A working document has been developed by the Alaska Land Use Council which identifies minimum data standards for making an adequate §810 assessment. (Alaska Land Use Council, Working Group II; November 28, 1984, Draft Standards and Guidelines for the Collection, Analysis, and Presentation of Subsistence Use Information for ANILCA §810 Determination, pp. 5-6.) In some cases existing data on subsistence uses may not be adequate to conduct a §810 analysis. Agencies must anticipate these special data needs at the earliest stages in the EIS process. Public meetings may be useful in compiling additional data on subsistence uses and needs. Additional research may also be necessary to address particular data gaps. New studies should be closely coordinated with the State of Alaska as required by ANILCA §812.

The §810 evaluation must thoroughly describe and document data about subsistence resources and uses so that all concerned parties can ascertain which resources and subsistence uses could be affected by a proposed action.

Identifying Alternatives

§810(a) also requires federal agencies to evaluate "...the availability of other lands for the purposes to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes."

In ANILCA §802 Congress states its policy that the "...utilization of the public lands in Alaska is to cause the least adverse impact possible on rural residents who depend upon subsistence uses of the resources of such lands...." It is therefore important that §810 analyses fully identify and explore alternative areas and approaches which would minimize adverse impacts on rural residents.

Determining Whether Actions Would "Significantly Restrict" Subsistence Use

Once the potential effects of the lease sale upon subsistence uses have been described, the next step required by §810 is to determine whether these effects could "significantly restrict subsistence uses...."

The legislative history of ANILCA gives no clue to the intended meaning of "significantly restrict." The closest parallel to the "significantly restrict" standard appears to be the requirement of the National Environmental Policy Act (NEPA) to analyze actions which may "significantly affect" the environment. Regulations of the Council on Environmental Quality (CEQ) for implementing NEPA state that both the context and intensity of impacts must be considered in deciding significance.

The people who would be affected, and the roles that the particular resources play in their lives provide the obvious context for evaluating significance in relation to restrictions on subsistence uses. The "intensity" of effects also has to be evaluated in relation to use of specific resources by people.

In §810 Congress recognized that subsistence uses are essential to many rural Alaskans, and intended federal land actions to have the least adverse impact possible upon them.

When considered in relation to this mandate, a "significant" restriction to subsistence uses is an effect which imposes a meaningful burden or hardship on particular people.

A determination of "significance" therefore requires discussion of such factors as socioeconomic circumstances, the degree to which harvest of particular resources could be reduced by the proposed action, and the consequences of the frequency, timing, and location of restrictive effects. These need to be evaluated in the context of the people who actually harvest and use the potentially affected resources, and in the context of what would constitute a meaningful burden to those people.

A hypothetical example may be useful in demonstrating the approach suggested above:

During an EIS study a proposed lease sale is determined potentially to affect local salmon stocks. The studies suggest that the activity will not have a major impact on regional salmon populations or regional harvest levels, but depending on its timing and precise location, it could reduce a particular stock or run. It is impossible, given uncertainty about where or when the activity will occur, to predict exactly which salmon stock might be affected. However, the EIS has identified 20 communities and groups of people who make subsistence use of the salmon runs which migrate through the general impact area and could be affected. The §810 evaluation therefore identifies these communities and the potential risks. It then examines what effect a reduction in a local salmon run could have for households within typical communities, perhaps dividing the communities into four or five categories, based on location, degree of reliance on subsistence resources, and so forth.

In the hypothetical example, the FEIS concludes that the proposed action could substantially reduce local stocks of king salmon for one or more seasons. As subsistence uses have been shown to occur on these stocks the §810 analysis would then identify this as a potential restriction and then go on to determine whether the action would "significantly restrict" the subsistence use of king salmon. In this analysis king salmon are one of the first fresh foods available to particular households in early summer, and the loss of king salmon for one or more seasons would be a meaningful burden on families in the communities. The §810 analysis, after weighing the risks to subsistence use of king salmon against the important role of king salmon to the people, might conclude that the action could "significantly restrict" subsistence use of king salmon in several of the communities.

Meeting Notice and Hearing Requirements

§810(a) requires the head of each federal agency to meet certain notice and hearing requirements before allowing an action which would significantly restrict subsistence uses. The appropriate state agency and appropriate local committees and regional councils established under §805 must be notified, and a hearing must be held in the vicinity of the area involved.

In ANILCA §801 Congress clearly stated its intent that rural residents, who have knowledge of local conditions and subsistence requirements, should have a meaningful role in decisions affecting subsistence uses and needs. The specific requirements of §810 are intended to ensure that federal agencies have the best available information about the potential effects of proposed actions on rural residents. They also seem, when taken in conjunction with §810(a)(3), to be intended to ensure that local knowledge and experience is brought to bear on the requirement that adverse impacts on subsistence be minimized.

Again, a community focus in evaluating effects would simplify the notice and hearing requirements. Each §810 evaluation should include a map and list of the communities potentially affected, and identify those where subsistence uses could be significantly restricted. In this way §810 assessment itself would indicate many of the groups which should be notified.

It is [redacted] for agencies to follow the §810 procedures for public involvement in instances where a determination of significance is not clear or where there may be significant restriction even though certain data may not yet be available to support the finding.

Public notification of hearings following a determination of significant restriction should follow several avenues, including:

1. Notice published in local and regional newspapers;
2. Notice mailed to local fish and game advisory committees, regional councils, local governments, and Native organizations;
3. Notice aired on local radio and/or television broadcasts;
4. Notice posted in community halls and other local meeting places; and
5. Personal communications with individuals or groups known by the land manager to have an interest in the action.

Minimizing unavoidable adverse impacts upon subsistence uses and resources

§810(a)(3) requires three findings before an action which would significantly restrict subsistence uses can procede.

1. That such a significant restriction of subsistence uses is necessary, consistent with sound management principles, for the utilization of public lands.

This finding of necessity should be specific to the proposed action, and should be based upon an analysis of the potential impacts upon subsistence uses and the relative value of the proposed action in meeting the goals for the use of public lands.

2. That the proposed activity will involve the minimal amount of public land necessary to accomplish its purposes.

The finding of necessity should exclude all public lands that are not necessary to achieving the proposed purpose.

3. That reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources.

Identification and consideration of possible mitigation measures are required to minimize the adverse impacts to subsistence uses that could result from the proposal to use, occupy, or dispose public lands. These can take many forms, and as noted above, public involvement can play a key role in developing suitable mitigation measures.

The following categories represent a broad range of types of mitigation measures:

1. Alternatives for deleting public lands from the proposed action to reduce the risk of potential subsistence resource restriction.
2. Alternatives for reducing impact to seasonal camps and other harvest and use locations;
3. Alternatives for reducing habitat changes that may reduce species abundance and decrease harvest opportunity;
4. Alternatives for reducing numbers of people living in, working in, or passing through area;
5. Alternatives for reducing numbers of people competing for resources;
6. Alternatives for reducing disturbance, roads, noise, water quality degradation, etc., that may affect distribution of species;
7. Alternatives for reducing land classification and ownership changes;
8. Alternatives for reducing changes in access routes to use areas; or
9. Alternatives for compensating people for losses.

Time and area restrictions on activity may frequently be useful in mitigating effects on subsistence uses.

Summary

Federal agencies can satisfy the requirements of ANILCA §810 by following the systematic approach outlined above. An adequate §810 evaluation for an OCS oil and gas lease sale would clearly meet the following standards:

1. [illegible]tify the people who make subsistence use of all wild resources which would be affected by the proposed action;

2. Identify the nature of their subsistence uses and needs for these resources;

3. Describe the potential effects of the proposed action on wild resources and upon community subsistence uses and needs, and identify which of these effects could be restrictions;

4. Make a determination of whether potential restrictions would be "significant" in the context of the meaning of the affected resources to the people who use them, and the role the resources play in their lives;

5. Identify alternatives that would minimize adverse impacts on rural residents;

6. If the proposed action could significantly restrict particular subsistence uses:

   a. meet notice and hearing requirements;

   b. make findings that;

      1. the necessity for the proposed action outweighs the risks to subsistence;

      2. the proposed action will involve the minimal amount of public lands needed to accomplish its purpose;

      3. reasonable steps will be taken to minimize adverse impacts upon subsistence uses and needs.

7. Thoroughly document all data and findings so that concerned parties have access to them.

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REPORT OF THE CARIBOU IMPACT ANALYSIS WORKSHOP, ARCTIC NATIONAL WILDLIFE REFUGE

November 19-20, 1985

Compiled and Edited by

Glenn W. Elison
U.S. Fish and Wildlife Service
Arctic National Wildlife Refuge

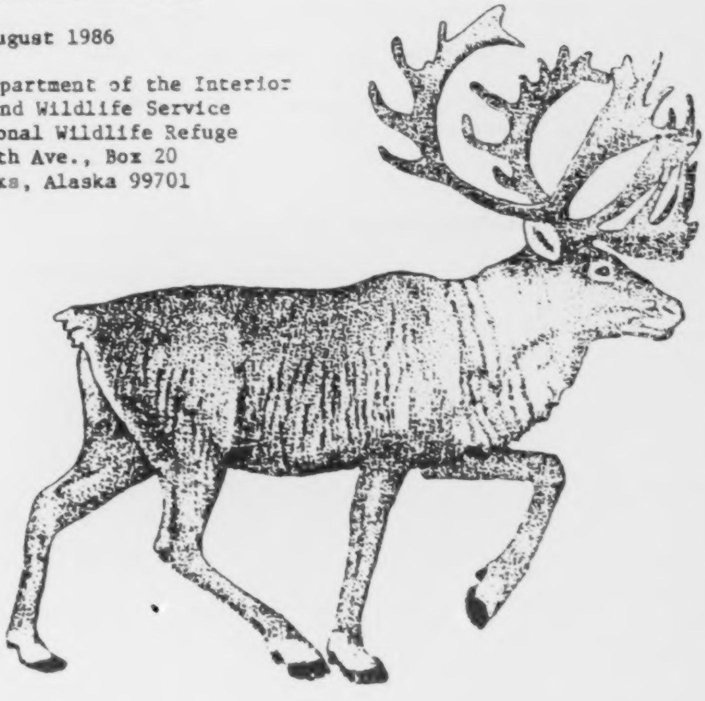
Ann G. Rappoport
U.S. Fish and Wildlife Service
Regional Office, Anchorage

and

Gerald M. Reid
U.S. Fish and Wildlife Service
Regional Office, Anchorage

August 1986

United States Department of the Interior
U.S. Fish and Wildlife Service
Arctic National Wildlife Refuge
101 12th Ave., Box 20
Fairbanks, Alaska 99701



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EXECUTIVE SUMMARY

Fourteen caribou biologists met to discuss the potential effects on caribou of petroleum development on the coastal plain of the Arctic National Wildlife Refuge. The biologists analyzed a hypothetical development scenario which was representative of the type of petroleum development which may occur on the coastal plain. The group expected the development would produce a negative effect on coastal plain caribou populations and their distributions. However, agreement was not reached on the magnitude of that effect. Greatest concern focused on displacement from traditional calving areas, followed by displacement from, or inhibited access to, habitat used for relief from insect harassment. Many other aspects of caribou biology and effects of petroleum development were also discussed. Mitigation measures focused on reducing disturbance and impacts of the infrastructure associated with petroleum development. Potential mitigation included permanently closing the "core" of the traditional calving area to development, limiting area access to essential personnel only, closing the development area to all hunting, designing pipelines to facilitate caribou passage, consolidating facilities, and implementing time and area closures to minimize disturbances to caribou during their critical life stages. The group was concerned that the scenario did not consider the cumulative effects of potential petroleum development offshore or on adjacent state and private lands.

INTRODUCTION

A workshop to discuss potential effects of oil development on caribou was held in Fairbanks, Alaska, November 19-20, 1985. The workshop was hosted by the U.S. Fish and Wildlife Service (FWS), which was seeking expert opinion on such effects, as part of the environmental analysis portion of the Arctic National Wildlife Refuge (ANWR) coastal plain resource assessment. The Alaska National Interest Lands Conservation Act (ANILCA) section 1002 established the coastal plain study area and directed the assessment be conducted. The study area is referred to in this report as the "1002 area" (Fig. 1). Section 1002(h) of ANILCA required an evaluation of: the oil and gas potential of the 1002 area; fish, wildlife, and their habitats in the area(s) with oil and gas potential; and potential petroleum development effects on those area(s)' fish, wildlife, and habitats. The 1002(h) report is due to Congress by September 2, 1986.

Workshop participation was limited to individuals with experience in studying caribou, particularly studies related to the interaction of caribou with arctic oil development. A list of participants, workshop facilitators, and their affiliations and the meeting agenda are attached (Appendix 1).

Prior to the workshop, participants were sent an information packet containing:

1. Preliminary maps of caribou use areas within the 1002 area and adjacent locations [Porcupine caribou herd (PCH) concentrated calving areas from

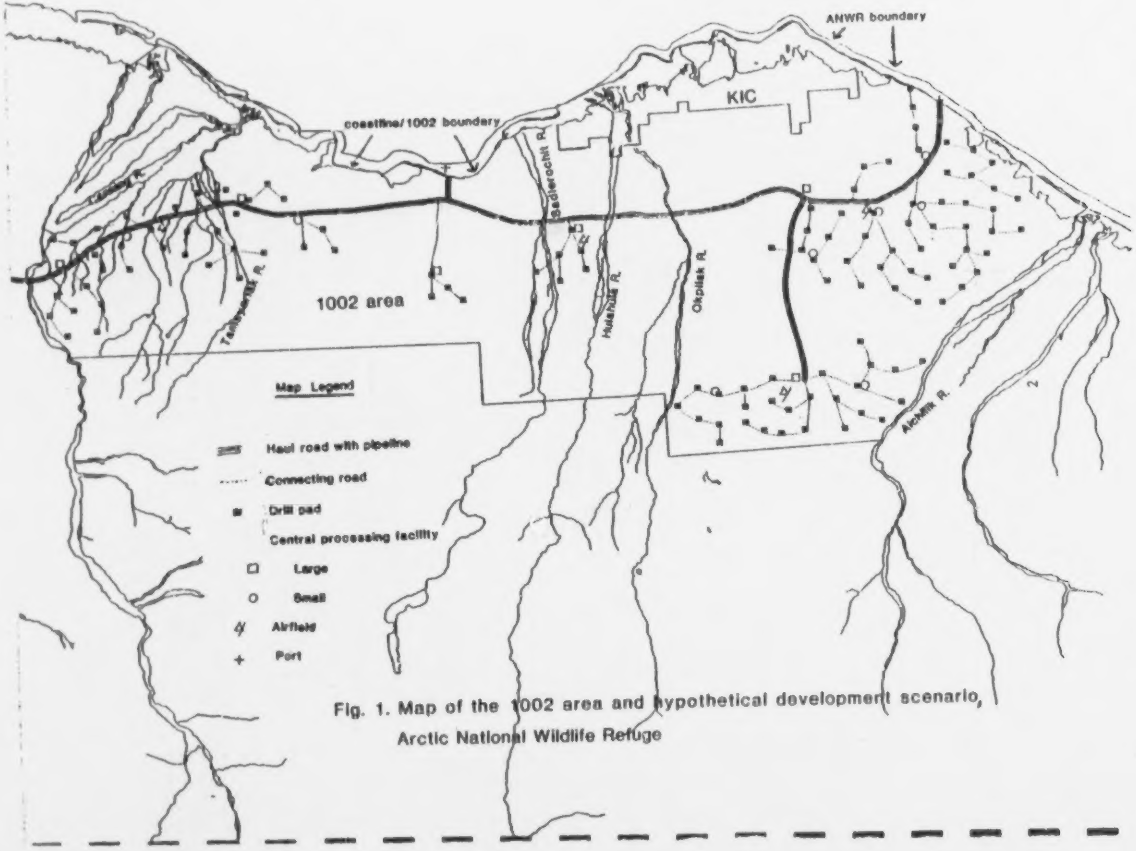

ANWR boundary
KIC
coastline/1002 boundary
Sadlerochit R.
Hulahula R.
Okpilak R.
Aichilik R.
2
Tamayariak R.
1002 area
Map Legend
Haul road with pipeline
Connecting road
Drill pad
Central processing facility
Large
Small
Airfield
Port

Fig. 1. Map of the 1002 area and hypothetical development scenario, Arctic National Wildlife Refuge

1972-1985 (Fig. 2); PCH insect relief areas (Fig. 3); and Central Arctic caribou herd (CAH) range, calving grounds, and insect relief areas (Fig. 4)];

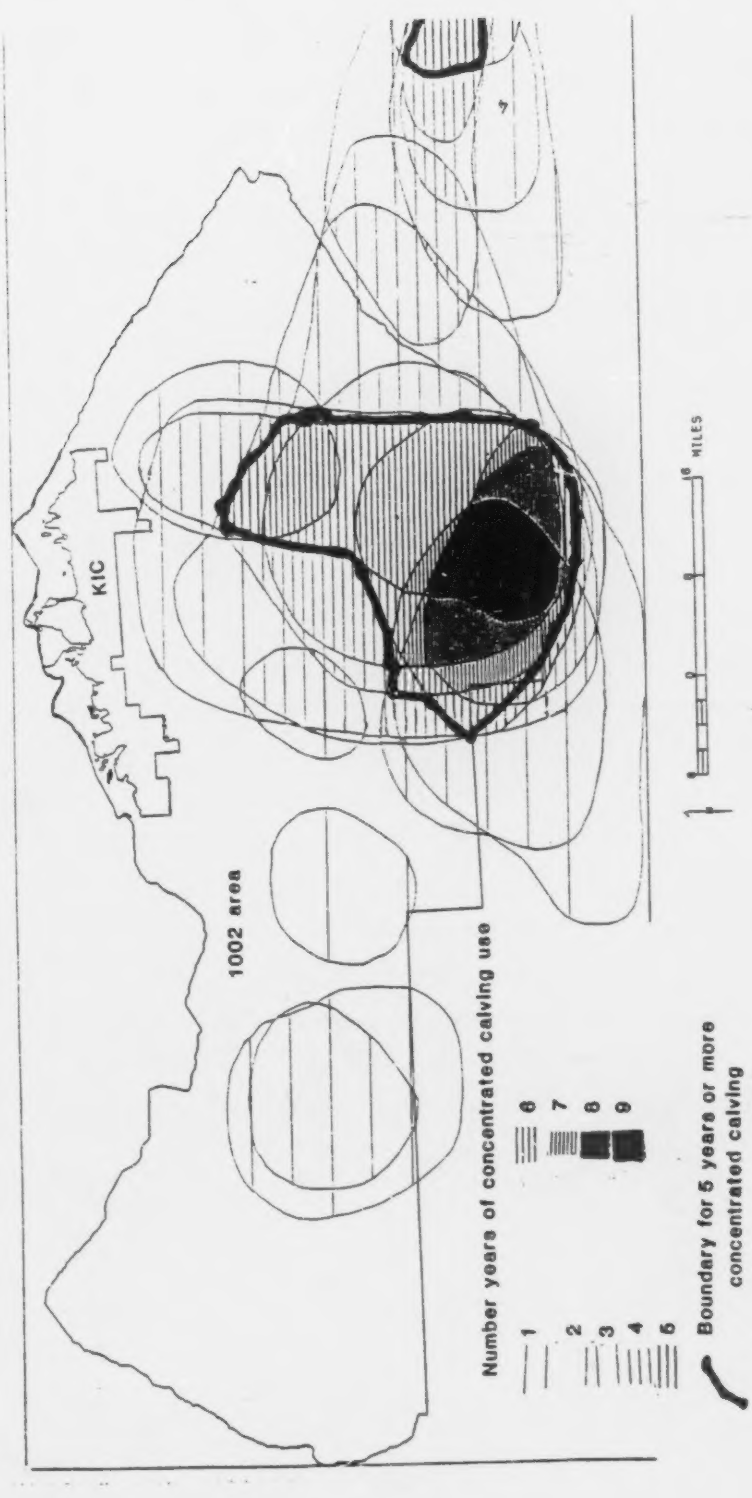
2. A hypothetical oil development scenario describing the scope of facilities, gravel requirements, direct habitat changes, and disturbance factors (Appendix 2);

3. Copies of various reports about caribou from the ongoing FWS Baseline Study (FWS, 1982; Garner and Reynolds, 1983, 1984, and 1985) on the ANWR coastal plain.

A map of the hypothetical development scenario was available at the workshop (Figure 1). The scenario was designed to raise major issues regarding the interaction of caribou with oil development, e.g., development in major calving areas and insect relief habitat, transecting migration routes with infrastructure, and disturbance effects. Participants were requested to focus their attention on the 1002 area because development on adjacent private lands, offshore waters, state lands and in Canada is highly speculative and beyond the scope of the report due to Congress. The FWS recognized that although development in those other areas may have a major influence on caribou as well as other fish and wildlife, the analysis of such impacts was beyond the scope of this workshop. The group was asked to discuss issues by:

1. describing how caribou using the 1002 area would be affected by oil development;

Fig. 2. Porcupine caribou herd concentrated calving area


KIC
1002 area
Number years of concentrated calving use
1
2
3
4
5
6
7
8
9
Boundary for 5 years or more concentrated calving
MILES

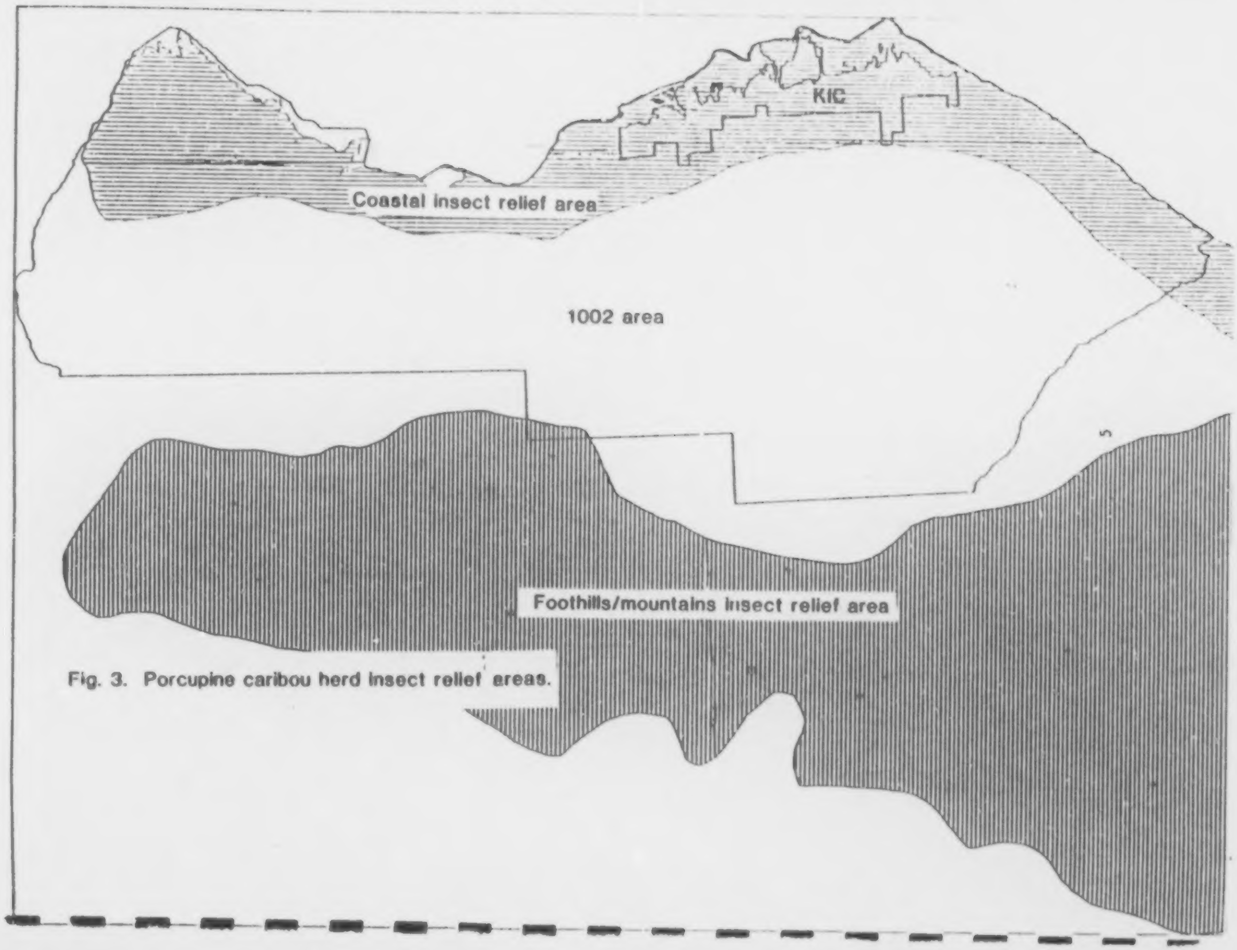

KIC
Coastal insect relief area
1002 area
5
Foothills/mountains insect relief area

Fig. 3. Porcupine caribou herd insect relief areas.

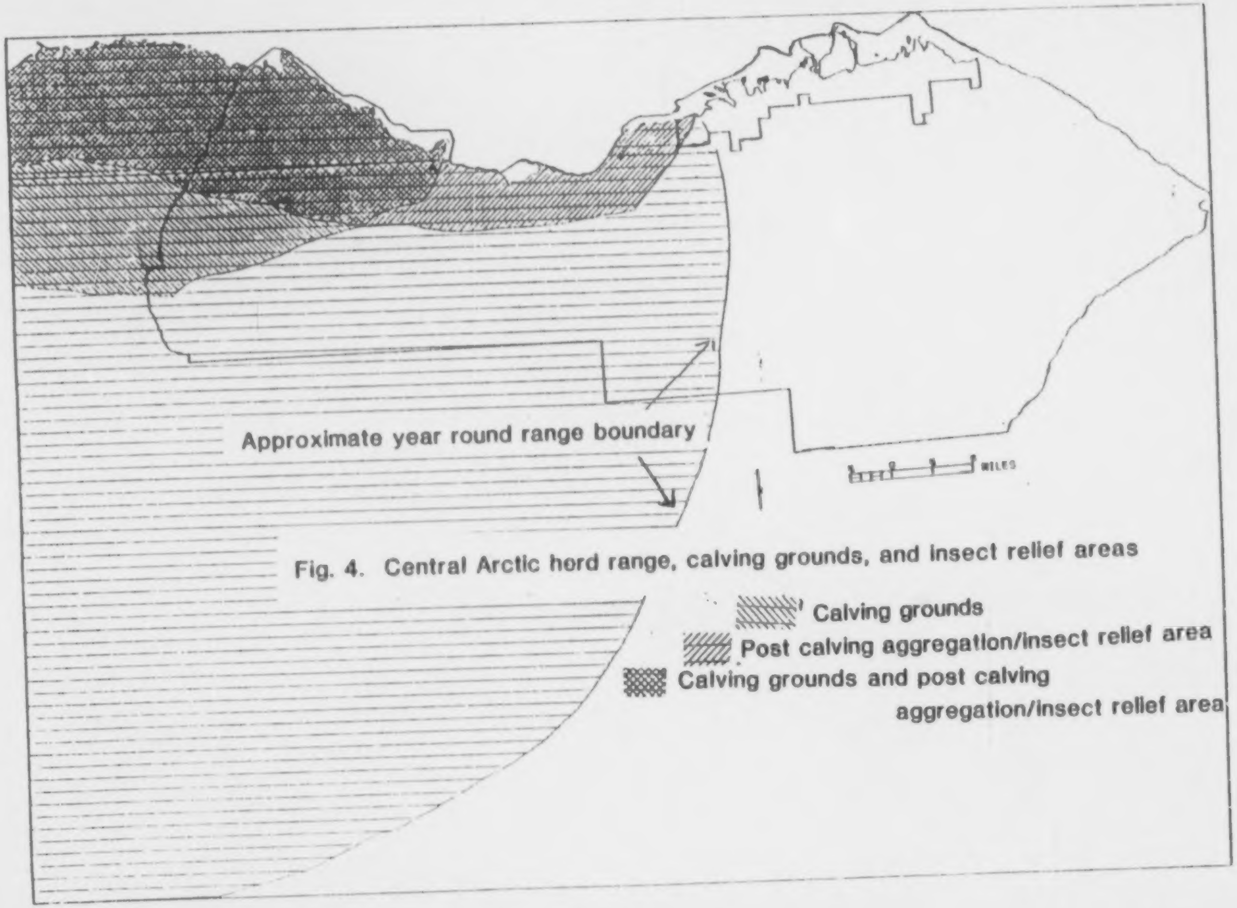

Approximate year round range boundary
MILES
▨ Calving grounds
▨ Post calving aggregation/insect relief area
▩ Calving grounds and post calving aggregation/insect relief area

Fig. 4. Central Arctic herd range, calving grounds, and insect relief areas

2. qualitatively describing the magnitude of potential effects (the group was given terms and draft definitions for use in characterizing effects) (Table 1);

3. suggesting mitigation which could reduce negative effects; and

4. identifying any area(s) where negative effects would be of such magnitude, even with mitigation in place, that those area(s) should be closed to development.

The meeting was conducted in three sessions: plenary introduction, breakout work groups, and plenary conclusion. In the introductory session, the meeting purpose, 1002(h) report, hypothetical development scenario, background maps and biological information were described. The FWS presented a synopsis of results of the Baseline Study (FWS, 1982; Garner and Reynolds 1983, 1984, and 1985) which was required by section 1002(c) of ANILCA. The Alaska Department of Fish and Game presented a brief overview of the PCH population status and recent census efforts.

In the breakout session, workshop participants were divided into three groups to enhance discussion and maximize the number of issues and ideas examined. The discussion in each group was facilitated by a member of the FWS Environmental Assessment Team, the team responsible for preparing the analysis of environmental impacts for the 1002(h) report. The facilitators could also answer questions on potential oil development within the 1002 area; they

TABLE 1. Draft definitions of effects to caribou from oil development on the coastal plain of the Arctic National Wildlife Refuge

EFFECT LEVEL	DEFINITION
Major:	A reduction in population and/or habitat availability and quality which may cause a coastal plain population to decline in abundance and/or distribution beyond which natural recruitment does not return it to its former level within several of that species' generations.
Moderate:	A reduction in population and/or habitat availability and quality which may cause a portion of a coastal plain population to change in abundance and/or distribution over more than one of that species' generations but is unlikely to affect the regional population.
Minor:	Short-term, local disruption of population and/or habitat availability and quality for a local species population with recovery within one of that species' generations.
Negligible:	Changes in population and/or habitat availability and quality to a coastal plain population which do not result in detectable changes to that regional population.

and other group members could provide further detailed biological information on other resources of the area.

In the final plenary session, each group presented its conclusions about probable effects of oil development on caribou and recommended mitigation measures. During this plenary session, discussion centered on identifying conclusions for which there was agreement. Key issues for which consensus had not been reached were also identified. Other issues of concern for which time did not permit complete discussion during the plenary session are described in Appendix 3.

Appendix 4 is a brief summary of caribou use of the ANWR coastal plain. It is included for the benefit of readers not familiar with the area.

RESULTS AND DISCUSSION

The PCH quickly became the focus of the workshop because of its size and historic use of the ANWR coastal plain for calving, post-calving activities (including movements between inland foraging areas and coastal insect relief habitats), and post-calving aggregations. Participants agreed that oil development, as presented in the scenario, would have a negative effect on the PCH.

Diverse views were presented on exactly what effects would occur and the expected magnitude of those effects. It was agreed that displacement from the historic calving area is a major issue. It was believed that such displacement would occur and could result in reduced caribou production. Factors suggested as causing reduced production include a combination of: increased predation, less nutritious forage, later snow melt, and possibly other factors associated with the area(s) to which the PCH would be displaced. Furthermore, calving is the time when maternal cows and their calves are most sensitive to disturbance and also the time when this segment of the PCH is expected to have the greatest interaction with petroleum development, under the given scenario.

Disturbance as a cause of displacement was also a major concern. Hunting near development, traffic, and general activity associated with petroleum development could all displace caribou. Increased predation or harassment by insects, as well as other adverse effects, could occur depending upon where and when displacement occurred.

Other developments which may occur in offshore areas and on adjacent private and state lands could also produce cumulative effects which need to be considered when assessing impacts to North Slope caribou in general. However, the group refused to speculate on the quantitative impact petroleum development would produce on caribou. Interaction of a caribou herd the size of the PCH with the amount of development presented in the scenario is without precedent.

CONCLUSIONS AND RECOMMENDATIONS FROM THE PLENARY SESSION

In the closing plenary session, there was agreement on issues and conclusions listed below. A brief discussion of each issue is followed by specific mitigative recommendations where applicable. Some of the recommendations listed were augmented by the FWS as follow-up to the group's discussions and conclusions and based on input during the more detailed work group discussions.

1. The area of sustained calving use by the PCH was generally identified and subsequently defined by the FWS as the location in which there has been concentrated calving activity in at least 5 of the last 14 years for which detailed records are available (1972-1985). The characterization of concentrated or core calving is subjective. Since 1981, an estimated density of 19 or more caribou per km^2 ($50/mi^2$) has been used to characterize core areas for the PCH during annual monitoring of calving activity by the FWS and ADF&G. Prior to 1981, caribou density in areas identified by other observers as core calving areas is unknown. However the difference in caribou density between core and peripheral calving areas is readily apparent, so it is assumed that use of the term "core" by previous observers reflects densities of similar magnitude.

   Recent work has shown that maternal caribou have been displaced from areas within approximately 3 km of roads associated with North Slope oil development (Dau and Cameron, 1985). Consequently, workshop participants predicted displacement of the PCH from much of its concentrated calving area, given the likely locations of pads and roads within the 1002 area. Effect of this displacement is expected to be adverse. However, workshop participants would not speculate on where the displaced caribou would go nor the magnitude of the adverse effect. Participants felt that they could not accurately quantify the numbers of caribou to be affected by various aspects of the development scenario, particularly given the general nature of the scenario.

Recommendation: The area of sustained calving use (Fig. 2) should be deleted from leasing. (There was one dissenter from this view).

2. Hunting can be a negative reinforcement which increases sensitivity to disturbance, decreases habituation to development, and prolongs the reaction of caribou to disturbances such as road traffic. Thus, when hunting occurs in the vicinity of development, it can reinforce avoidance behavior by caribou toward other disturbances. As a result, there may be greater reluctance of caribou to cross through developed areas to reach historical use areas and a general avoidance of development.

Recommendation: Developed areas should be closed year-round to all hunting of caribou to prevent the additional disturbance and negative reinforcement that such activity produces. A closure of 8 km (5 mi) on either side of pipelines, road corridors, and developed areas was recommended. Modifying the caribou hunting season (which currently includes July and August) to September 1 through April 30 in the 1002 area was also suggested as a means of reducing disturbance to the PCH.

3. Ramps have been used with mixed success in facilitating caribou movements across pipelines. Poor success has been associated with placement of ramps in areas not regularly traveled by caribou or with poor ramp design.

   Recommendation: Ramps should be considered where roads and pipelines come together creating artificial funnels affecting caribou movements and for areas of high crossing probability based upon historic migration or movement patterns. Future studies should be designed to identify need, placement and design of ramps.

4. Potential for displacement caused by disturbance will be greatest during the construction phases of oil development, because of the presence of more workers and higher activity levels. Effects on caribou will likely be most acute during the calving period and times of severe insect harassment. Displacement can result in increased predation and energy stress, which may reduce survival. These effects can be avoided or minimized by time and area closures which eliminate or reduce activities in caribou concentration areas, particularly during the sensitive calving period, usually late May to mid-June.

   Recommendation: Time and area closures should be implemented for surface and air traffic to minimize disturbances to caribou, especially calving caribou.

5. Habitat disturbance can be reduced by centralizing facilities.

Recommendation: Facilities should be consolidated and redundant facilities eliminated. Developing only one sea port and one main airport should be considered. Placing marine facilities west of the Hulahula River will reduce potential effects to PCH moving between coastal insect relief habitats and inland feeding areas.

6. Recent research indicates that separating roads from pipelines reduces the avoidance reaction of caribou to those structures (Curatolo and Murphy, 1983; Curatolo and others, 1982; Robus and Curatolo, 1983). The separation distance depends upon traffic level and terrain, but 600-800 feet appears to be an appropriate average distance based upon preliminary findings of research conducted in the central Alaskan arctic.

Recommendation: Separate roads and pipelines transecting caribou use areas. The configuration and separation distance should be determined by further study.

7. Habituation by caribou to development will not likely compensate for negative effects (displacement), although workshop participants agreed they did not know how much habituation would occur over time. Without negative reinforcement (e.g., hunting, harassment from workers, etc.), caribou may partially habituate to development. The PCH would be in contact with development for a relatively brief period annually, and would therefore be less likely to habituate than the CAH. At least part

(less than 10 percent) of the CAH uses the Prudhoe Bay development area year-round and approximately half of the CAH is in contact with development from mid-May to mid-August.

Some habituation has occurred in the CAH but it has been greater in males than females, particularly females with young. PCH females with young are expected to be that segment of the herd having greatest contact with oil development based upon the given scenario and historical use of the area. Because females with young are particularly sensitive to disturbance, the probability of habituation by that portion of the PCH is expected to be low.

8. Direct habitat loss, e.g. gravel mine sites, gravel pads, etc., would be minor if project design is such that facilities are not located in key caribou use areas, e.g. calving and insect relief areas.

   Recommendation: Design project so that facilities are located in least sensitive habitats and use areas.

9. Disturbance to caribou by petroleum development would be directly related to the number of people and vehicles in the 1002 area. Limiting access to project personnel engaged in official activities will minimize the potential for disturbances to caribou.

   Recommendation: Access to the development area should be limited to essential personnel.

10. Several participants expressed concerns over the current piecemeal nature of North Slope oil development. They believed this had led to unnecessary duplication of facilities. Mitigation has been less effective than desired, at least partly because mitigation planning has often been based on incomplete development plans.

Recommendation: A consolidated development/mitigation plan should be formulated for the North Slope.

11. Informing exploration, construction, and production workers of fish and wildlife values and environmentally sensitive operation methods and travel routes, as well as providing full-time monitors can be effective measures for minimizing negative impacts.

Recommendation: Require environmental orientation of all 1002 area workers and on-site environmental monitoring in conjunction with any petroleum exploration and development.

12. The issue of pipeline design generated a substantial amount of discussion. It was agreed that proper pipeline design would result in the highest success of caribou crossings and the least disruption of natural caribou movements and activities. Buried pipelines were viewed as highly effective in allowing free caribou crossing, however, the inherent engineering problems in pipeline burial on the North Slope were

recognized. While the alternative of elevating pipelines on vertical support members (VSM) had unanimous approval, there was not agreement on the appropriate height. Terrain and other factors will affect the optimal height.

Recommendation: Wherever possible, pipelines should be buried. Otherwise, elevated pipelines should be placed on VSM's at least five feet high. Determination of appropriate VSM heights will require additional study.

13. Participants agreed that the magnitude of direct habitat loss from oil development could be reduced by rehabilitating areas no longer in production. Moreover, gravel could be removed from abandoned areas for future development, thus reducing the need to disturb additional habitat for new gravel.

Recommendation: Abandoned development areas should be rehabilitated. Gravel for other development areas should be mined from abandoned roads and pads as the opportunity arises, providing an overall benefit to the environment will occur.

14. The group was concerned that the 1002(h) report would not consider the cumulative effects of development in other potential areas e.g., the Outer Continental Shelf, private lands, State of Alaska waters and State land west of the Canning River. Effects on caribou of development in those areas could be additive to the effects of development in the 1002 area.

Recommendation: The report should address the probability of adjacent developments and potential for additional, cumulative effects on caribou.

POINTS OF GENERAL CONSENSUS

During the plenary session, time did not allow discussion of all issues raised within the work groups. However, discussions in the work groups revealed that there was general, though probably not complete, consensus on the following recommendations and aspects of caribou behavior in relation to likely effects of oil development:

1. Definitions of terms (Table 1) used to qualitatively characterize impacts were considered unsuitable for dealing with all wildlife populations. A two-tier evaluation is needed to characterize effects on those animals using the 1002 area as opposed to effects on the entire animal population. For example, separate evaluations are needed for petroleum development effects (1) on that portion of the PCH using the 1002 area, and (2) on the entire PCH population. Additional improvements to the FWS draft definitions were suggested by workshop participants, although a final consensus on effects definitions was not reached. Based on this input and subsequent internal discussions, the FWS prepared a revised set of definitions (Table 2).

2. The circular and often daily movements of caribou to and from coastal insect relief habitats were discussed. A majority of the biologists

TABLE 2. Revised definition of effects for draft 1002(h) report.

EFFECT LEVEL	DEFINITION
Major:	A widespread, long-term change in habitat availability or quality which would likely modify natural abundance or distribution of species using the coastal plain. That modification will persist at least as long as modifying influences exist.
Moderate:	A widespread, short-term change in habitat availability or quality which would likely modify natural abundance or distribution of species using the coastal plain; or a local modification in habitat availability or quality which would likely modify natural abundance or distribution at least as long as modifying influences exist.
Minor:	Short-term, local change of species' abundance, distribution, habitat availability or habitat quality.
Negligible:	Little or no change in population, habitat availability, or habitat quality.

believed that a 5-8 km (3-5 mile wide) non-development buffer zone should be maintained along the coast to facilitate caribou movements and access to insect relief habitat.

3. Maternal cows at calving and immediately thereafter in company with their calves are the segment of the population which is most susceptible to disturbance. Based on the given development scenario, it is that portion of the PCH which will encounter oil development on the 1002 area.

4. Roads will eventually become public, based on experiences in Canada and with TAPS, regardless of the original intent.

5. Public access to the 1002 area will increase.

6. Disturbance caused by air traffic is generally less of a problem than disturbance by surface traffic.

7. Road kills and other human-caused accidents will occur but will have minor effects on the caribou population.

8. Oil development on adjacent private and State lands or off-shore will confound the ability to predict effects of development on the 1002 area.

SUMMARY

Workshop participants believed there would be a moderate or major decline or displacement of the PCH as a result of the amount of development presented in the scenario. If the area of historic, concentrated calving identified in Fig. 2 is closed to leasing and surface occupancy, the negative effects, e.g., displacement from disturbance, would be substantially reduced. To further reduce disturbance effects on caribou, prohibiting all hunting around developed areas, restrictions on personnel access, traffic controls and other measures were recommended. Past experience with the CAH and the relatively brief period the PCH uses the 1002 area suggest there will be a low degree of habituation, particularly of maternal cows, to the presence of development.

Barriers to free movement of caribou through development areas can be reduced by placing ramps over pipelines, separating roads and pipelines, requiring elevated pipelines, controlling traffic, and limiting human access. Based upon past experience with TAPS and developments in Canada, project roads will eventually become public and use of those roads will increase regardless of the original intent. A final recommendation was to maintain a non-developmental buffer zone of 5-8 km (3-5 mi) wide along the coast to facilitate free movement of caribou and access to insect relief habitat.

Cumulative effects of development on all lands and waters within the PCH and CAH ranges must be considered to realistically assess impacts to caribou.

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APPENDIX 1. List of workshop participants, facilitators, and their affiliations.

Caribou Workshop Participants

Tom Bergerud, University of Victoria
Ray Cameron, Alaska Department of Fish and Game
Jim Dau, Alaska Department of Fish and Game
Gerald Garner, U.S. Fish and Wildlife Service
Ronald Jakimchuk, Renewable Resources Consulting Service, Inc.
Dave Klein, Alaska Cooperative Wildlife Research Unit
Art Martell, Canadian Wildlife Service
Frank Miller, Canadian Wildlife Service
Steve Murphy, Alaska Biological Research
Larry Pank, U.S. Fish and Wildlife Service
Wayne Regelin, Alaska Department of Fish and Game
Scott Robertson, ARCO Alaska, Inc.
Dick Shideler, Alaska Department of Fish and Game
Ken Whitten, Alaska Department of Fish and Game

Caribou Workshop Facilitators

Glenn Elison, U.S. Fish and Wildlife Service
Ann Rappoport, U.S. Fish and Wildlife Service
Gerald Reid, U.S. Fish and Wildlife Service

APPENDIX 1, continued.

Caribou Workshop Agenda

November 19, 1985

9:00 - 9:15	Welcome, introduction of participants, and administrative details.
9:15 - 9:30	Purpose of the meeting
9:30 - 10:00	Background of the coastal plain resource assessment
10:00 - 10:15	Break
10:15 - 11:30	Review of the Baseline Study concerning caribou Outline of specific objectives to be accomplished Assignment of subgroups
11:30 - 1:00	Lunch
1:00 - 5:00	Subgroups meet

November 20, 1985

8:30 - 10:00	Subgroups meet
10:00 - 10:15	Break
10:15 - 11:30	Subgroups report conclusions and recommendations
11:30 - 1:00	Lunch
1:00 - 4:30	Reconcile disagreements in the subgroups' reports

SUBGROUPS

Elison
Jakimchuk
Bergerud
Shideler
Pank

Rappoport
Murphy
Martell
Cameron
Whitten
Klein
Regelin

Reid
Garner
Miller
Dau
Robertson

APPENDIX 2. Hypothetical Oil Development Scenerio

Scenario for Potential Oil and Gas Development on the Coastal Plain of Arctic National Wildlife Refuge (ANWR)

If oil and gas developments are authorized on the 1.5 million acre coastal plain of ANWR, the following scenario describes activities that could occur with development.

ACTIVITIES

Further exploration would likely preceed actual development. This would include additional surface geology and seismic exploration to "fill-in" or provide more detailed data in certain areas. Potential effects would be similar to those from such exploration to date, i,e. if exploration is confined to winter when most wildlife species are absent from the coastal plain, effects would primarily be visual tracks and local vegetation and soils disturbances. However, exploration would probably include several exploration wells, similar to the well now being drilled by Chevron on Kaktovik Inupiat Corporation lands.

With full scale development, oilfield facilities would be placed on thick gravel pads that maintain insulation and provide a stable work surface. Pads would be connected by gravel roads of similar construction. Drill pads and roads are typically placed on 5 feet of gravel fill.

The access road could be adjacent to or separated from the elevated pipeline used to transport any oil and gas produced. The main road pipeline system would extend approximately 150 miles from east to west across the coastal plain and adjacent state lands to pump station one of the Trans-Alaska Pipeline System. Multiple wells would be drilled from single, large drill pads evenly spaced about 2 miles apart. In the Prudhoe Bay area, the state originally restricted wells so that there was no more than one well for every 160 acre area. Lately the state has allowed one well per 80 acres; eventually, one well per 40 acre area may be allowed. The Bureau of Land Management has indicated that pad placement can often be flexible within a half-mile radius from the desired spot. Feeder pipelines would connect the well with central processing facilities and the main pipeline. A road system would be associated with those collecting lines and all other facilities. One main airfield would service the area with smaller airstrips likely at each oilfield which may be developed. One or two port sites for barging in supplies would also be associated with oil and gas development on the coastal plain; a road would connect the dock area with the oilfields.

Potential oilfields are scattered across the coastal plain. The number of drill pads would vary from one or two for oilfields of 200-2500 acres to 21 or 23 pads for oilfields of at least 120,000 acres. Pads could range in size from 20 to 35 acres. Total gravel needs for each drill pad could be 160,000 to 285,000 cubic yards. Drill site activities vary from intense and nearly continual during initial construction and expansion to minimal activity during normal operations. During the peak construction period as many as 1500 workers may be on the coastal plain.

Pits to contain drilling muds would be built adjacent to drill sites and cover from 1 to 6 acres each. For each oilfield, there would be one camp and large central processing facility requiring 90 acres (725,000 cubic yards of gravel). Larger fields may require one or two additional smaller central processing facilities of 40 acres each (330,000 cubic yards of gravel).

The main road and pipeline would require a right-of-way totalling 100 feet and approximately 3.3 million cubic yards of gravel. Access roads connecting drill sites to the main road would likely be heavily traveled only during construction, have a crown width of 42 feet, and minimum gravel requirements of 40,000 cubic yards/mi. Most powerlines would be overhead, built during winter, and maintained during summer with rolligons. Total roads, drill pads, and other facilities could cover 7300 acres and require 60 million cubic yards of gravel.

Gravel for the drill sites, roads, pipeline pads and other support facilities would come from pit mines in alluvial floodplains. An additional 1200 acres of coastal plain habitats could be modified by mining for gravel.

DIRECT HABITAT LOSS AND MODIFICATION

In addition to the direct loss of areas covered by oilfield facilities (i.e., drill sites, roads, pipelines, camps, etc.), physical effects can include impoundments, late snowmelt, and gravel spray from traffic, snow clearing or small construction spills. Road and pad activities also generate dust, noise disturbance, and contaminants. Powerlines, ice roads, and off-road vehicles are additional sources of disturbance. Off-road vehicle trails would be most noticeable in wet tundra types. Road maintenance includes snow clearing in winter and dust control during summer. Impoundments and dust from traffic are the other most noticeable impacts from roads. Adjacent to roads, thermokarst may appear as water-filled pits or trenches between polygons.

High levels of dust and noise disturbance are associated with all construction activities. Drainages blocked by drill sites, roads, or gravel pit overburden piles form permanent impoundments with thermokarst forming directly adjacent to the pad. Gravel spray and dust from traffic and intense activities around active gravel mines can affect vegetation adjacent to pads and lead to early snowmelt. In other locations, late-melting snowbanks may form on the west side of pads. They may also occur due to snow deposition during winter maintenance or naturally deposited drifts, depending on road orientation. Mud pits are a potential source of contaminants either through leaching of material through the berm or from pumping of pits. Unless actively filled, gravel mines remain beyond construction and are subject to flooding.

DISTURBANCE

Additional effects include continual noise from compressors and pumps; occasional gas and oil flaring is noisy and emits smoke and other material into the air. Disturbance, interference with wildlife movement routes, the presence of human activities in areas and at a much greater intensity than presently occurs, and alterations in consumptive wildlife uses could be further effects of oil and gas development in the coastal plain of ANWR.

EFFECTS TO CARIBOU

Using the caribou use area maps included here, workshop participants will be asked to interpret how various configurations of potential development may affect coastal plain caribou, given the activities and facilities described above. Estimating the magnitude of these effects should also be a discussion topic. Mitigation measures and the extent to which they can reduce any identified negative effects will also be considered. There will be opportunity to identify areas where negative effects would be sufficient to consider eliminating some area from potential development.

APPENDIX 3. Other Issues of Concern

Many other issues and specific points of caribou biology and interaction with petroleum development were raised within the work groups. Time did not permit discussion of all of those issues in the plenary session. Although one or more work groups reached agreement on some of those issues, it was either not determined if consensus existed or obvious that it did not. Biological factors and developmental effects which were discussed are listed below to demonstrate the range of discussion and, in some cases, conflicting views regarding caribou biology and the interaction of caribou with petroleum development. Some statements reflect individual opinions.

1. Resource decisions affecting the PCH may have a much greater impact than those affecting the CAH because:

    a. The relative size of the PCH is greater (PCH is estimated to total 165,000, CAH totals 12,000-14,000).
    b. Worldwide, one of the largest aggregations of caribou during a specific life stage (e.g. post-calving) occurs in the PCH.

2. Caribou displacement from developed areas will occur as a result of several factors. Human activity, particularly traffic, is the largest displacement/diversion stimulus. Pipelines, depending upon their configuration, may also be a barrier to caribou movements. Another barrier to free movement and a cause of displacement is roads; roads with frequent activity are a greater barrier than roads with minimal activity.

3. Cows with calves are less tolerant of disturbances than single cows or bulls. Cows and calves react when disturbances are further away and once disturbed they are displaced farther.

4. Gathering lines may become a major barrier to caribou movement if the lines are constructed without mitigative measures (e.g., elevated lines with ramps.)

5. Caribou preferentially used ramps to cross pipelines in Kuparak when adjacent VSM's were five feet, however, studies have not shown an increase in crossing success, i.e., caribou show preference but not necessarily a significant increase in success.

6. The PCH has more insect relief habitat options than the CAH. In addition to coastal areas, the PCH has access to insect relief areas in the mountains (wind blown ridges, aufeis fields, and snow banks).

7. The effects on caribou of modifications or disturbances are less critical in insect relief habitat than in calving habitat.

8. Large groups of caribou that form in response to heavy mosquito harassment are less successful moving through industrial areas than are small groups.

9. Aircraft harassment will not likely be a problem.

10. Participants could not agree regarding the effects of petroleum development on energetics. Thoughts expressed included:

    a. Development will result in negligible effects on energetics given current range utilization.
    b. Nutrition effects may interact with other factors.
    c. Predators and insects are driving factors for habitat selection by caribou--not nutrition.

11. Caribou select calving areas as a predator avoidance strategy. Some of the participants believe that predator avoidance is one of many reasons why caribou select a particular calving area.

12. Caribou must be able to disperse at calving. Displacement from normal calving areas may cause clumping in peripheral areas and increase predation.

13. Effects of petroleum development on the PCH (e.g. displacement) could result in a major decrease in the subsistence harvest of caribou, particularly at Kaktovik.

14. Riparian communities may be important feeding areas for caribou and should be protected.

15. Some small caribou herds in British Columbia have been extirpated when their calving grounds were lost to development.

16. Development will produce a major negative effect on the segment of the PCH using the 1002 area.

17. Development will produce a major negative effect on the PCH herd at large.

18. Development will produce no detectable effect on the PCH.

19. Access to PCH calving and insect relief areas west of the potential development will be inhibited.

20. Examining snow melt patterns may help define calving areas.

Mitigation recommendations made in work groups but not fully discussed in the final session included:

1. Bury pipelines, particularly feeder lines, inside the roadbed.
2. Bury pipelines when permafrost free soils are present.
3. Build pipelines from ice roads.
4. Raise pipelines to 7 or 8 feet at VSM's. Caribou need to be able to see under the pipeline to facilitate passage.
5. Reduce traffic speeds.
6. Pulse traffic, e.g. allow traffic to depart a specific point for only ten minutes out of every hour.
7. Align roads parallel to animal movements where appropriate.
8. Establish aircraft corridors to minimize disturbing animals in calving and other high use areas.
9. Establish minimum flight levels (1,000'-2,000' above ground level).
10. Route infrastructure as directly as possible.
11. Route the pipeline corridor along the coast from the eastern portion of the 1002 area to just west of Camden Bay, then move inland to fully avoid the CAH's calving areas and insect relief habitat on the Canning River Delta. A coastal route would be better for the main haul road because an inland haul road could affect a larger portion of the habitat more intensively used by the PCH. The reverse would be true for the CAH within the 1002 area. North-south roads extending to inland work pads will have less traffic than east-west haul roads.

APPENDIX 4. Use of the Arctic National Wildlife Refuge coastal plain by the Porcupine and Central Arctic caribou herds.

Portions of the Porcupine and Central Arctic caribou herds are found within the 1002 area during various times of the year. Each herd has specific distributions, movement patterns, and herd dynamics.

Porcupine caribou herd. The Porcupine caribou herd (PCH) is an international resource, estimated at 165,000 animals in 1985. The herd is increasing and is one of the largest herds in North America (Whitten, 1986). Population estimates for the PCH have ranged from 165,000 (Whitten, 1986) to 101,000 (LeResche, 1972). It is unclear if some of the earlier estimates are lower because of actual reduced abundance, less accurate or less complete survey techniques, or a combination of these factors. Caribou populations appear to fluctuate unpredictably over the long term. The long term maximum and minimum population size of the PCH or the actual carrying capacity of the PCH range is unknown.

The PCH ranges over 96,000 square miles of northeast Alaska and northwest Canada, and constitutes the largest population of large mammals shared between the two nations. Virtually the entire 1002 area is part of the traditional calving grounds of the PCH, extending throughout the Arctic foothills and 1002 area from the Canning River in Alaska to the Babbage River in Canada. The greatest concentration of calving usually occurs between the Hulahula River and the Canadian border. Since 1972 the PCH has calved over approximately 8.9 million acres (Table A). Concentrated calving (greater than 50 caribou/sq. mi.) has occurred within about 2.1 million acres of the 8.9 million acres. Of the 2.1 million acres, about 311,000 acres has been the core calving area during at least 5 of the 14 years from 1972-1985. The 1002 area represents 17 percent of the total calving area, 44 percent of the concentrated calving area, and 78 percent of the core calving area. During postcalving movements, extremely large, dense aggregations of caribou are common in the area. Although rather small in proportion to the herd's entire range, the calving/postcalving area is an important, identifiable habitat that has been repeatedly used by the PCH during these critical life stages.

Spring migrations to the calving grounds start in May from winter ranges which are usually south of the Continental Divide in Alaska and in central Yukon Territory and adjacent Northwest Territories in Canada (Fig. A). Timing and routes of migrations vary annually depending on winter distributions, snow conditions, and the onset of spring weather. Most caribou migrate to reach the calving grounds of the 1002 area from Canada, moving westward along the northern foothills of the Brooks Range. In some years many caribou also pass through mountain valleys east of the Aichilik River in Alaska. These areas tend to be the first snow-free areas.

Table A. Size of Porcupine caribou herd calving area[1] in the United States and Canada, 1972-1985.

	U.S.	Canada	Total	1002 area	Percent of total within 1002 area
Core calving area[2]	311,000	0	311,000	242,000	78
Concentrated calving area[3]	1,584,000	533,000	2,117,000	934,000	44
Peripheral calving[4]	2,164,000	4,597,000	6,761,000	558,000	8
Total[5]	3,748,000	5,130,000	8,878,000	1,492,000	17

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[1] area in acres

[2] at least 50 caribou/sq. mi. during calving for at least 5 years

[3] at least 50 caribou/sq. mi. during calving in at least one year, includes core calving area

[4] less than 50 caribou/sq. mi. during calving in any year

[5] concentrated and peripheral calving areas

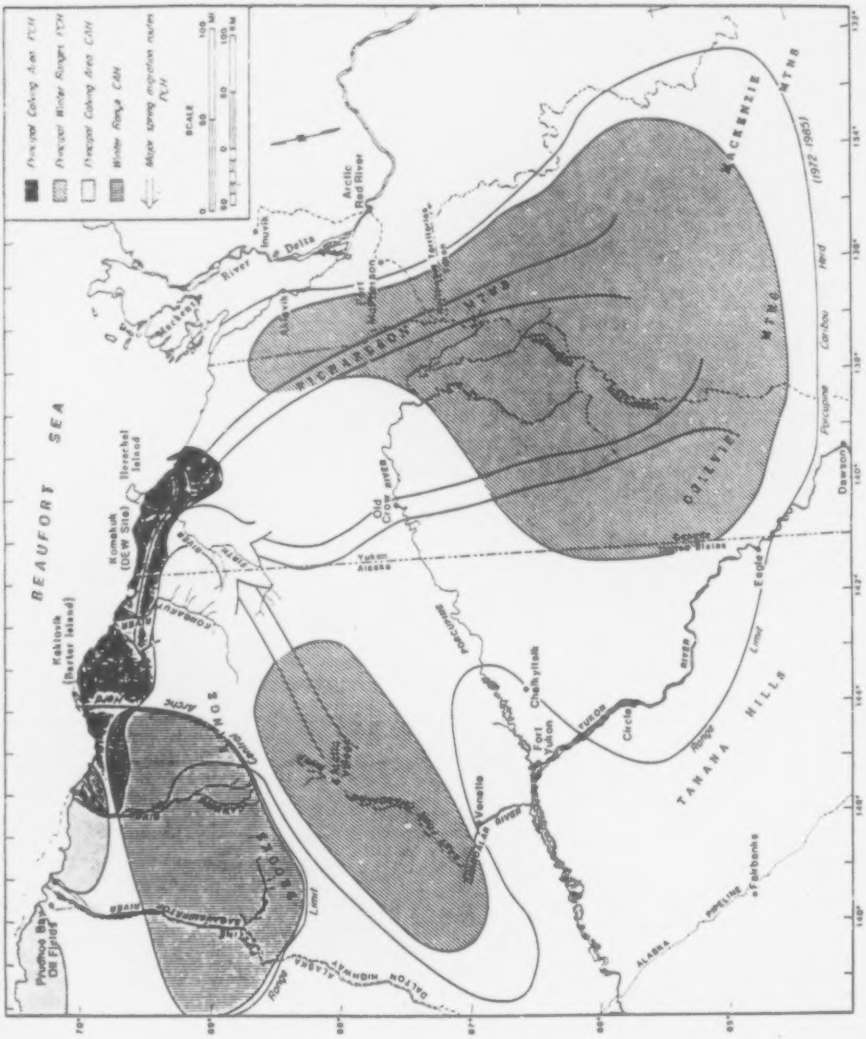
Principal Calving Area PCH
Principal Winter Ranges PCH
Principal Calving Area CAH
Winter Range CAH
Major spring migration routes PCH
SCALE
0 50 100 MI
50 0 50 100 KM
BEAUFORT SEA
Herschel Island
Komakuk (DEW Site)
Kaktovik (Barter Island)
Prudhoe Bay Oil Fields
Inuvik
Arctic Red River
Aklavik
Fort McPherson
Mackenzie River Delta
RICHARDSON MTNS
MACKENZIE MTNS
OGILVIE MTNS
Old Crow River
Yukon
Alaska
Canada
United States
Dawson
Eagle
Circle
Chalkyitsik
Fort Yukon
Venetie
Arctic Village
TANANA HILLS
Fairbanks
ALASKA PIPELINE
DALTON HIGHWAY
SAGAVANIRKTOK RIVER
BROOKS RANGE
PORCUPINE RIVER
YUKON RIVER
Porcupine Caribou Herd Range Limit (1972 1985)
70°
69°
68°
67°
66°
65°
148°
146°
144°
142°
140°
138°
136°
134°
132°

Figure A--Migration routes and winter range of the Porcupine caribou herd.

As spring conditions progress, caribou in the foothills spread northward along a broad front, primarily following the major river corridors and associated terraces where snowmelt has advanced. During years when snowmelt on the coastal plain is early, a broad zone north of the foothills is used for calving. In such years calving concentrations tend to be more northerly and scattered calving extends to the coasts. When spring is late, calving is more southerly and easterly, followed by a distinct movement west and northwest to the traditional calving grounds where there is less directional movement. During and immediately following calving, vegetated riparian habitats as well as tussock uplands are heavily used by foraging caribou. Riparian areas serve as travel corridors as well as important feeding areas in both spring and summer.

From year to year, the distribution of caribou on the calving grounds varies considerably. During the 14 years, 1972-1985, in which major observations were made, major calving concentrations of the PCH were in the foothills and the adjacent coastal lowlands form the Tamayariak River to the Canadian border (Fig. 2). Scattered calving has also occurred throughout the foothills and 1002 area from the Canning River eastward. The percentage of cows using the 1002 area for calving was estimated to be 74 percent in 1983 and 82 percent in 1985. In 1984, 35 percent of the cows calved in the 1002 area; 38 percent calved adjacent to the 1002 area, east of the Achilik River. The latter group moved into the 1002 area within a week of giving birth and joined the cows already in the 1002 area (FWS, unpublished data). These estimates were derived from explorations of locational data on radio-collared cows. Usually caribou begin to arrive on the calving grounds of the ANWR during mid- to late May. The first calves are born during the last week of May, peak calving occurs during June 4-8. Although calving has been observed in a variety of terrain types, most calves are born in snow-free areas of sedge tussock uplands. Predator densities are apparently less in these areas and, subsequently, calf survival is better in the northern parts of the calving grounds which become snow-free when snowmelt is early (U.S. Fish and Wildlife Service, 1982; Mauer and others, 1983; Whitten and others, 1984 and 1985).

In arctic areas, caribou reproduction is highly synchronous. The majority of calving occurs within a 2- to 3-week period, when a single calf is born to most adult females (3 or more years old). Caribou calves are precocious, being able to stand and nurse within 1 hour following birth. They are capable of travel with adults within a week. The first 24 hours of life is critical, when a behavioral bond is formed between the calf and its mother. Disturbance of maternal groups on the calving grounds may interfere with bond formation and increase calf mortality.

After calving, small bands of cows with newborn calves gradually merge into larger groups. Yearlings, barren females, and bulls occupying the southern and eastern periphery of the calving grounds begin to mix with the cows and calves, ultimately forming huge postcalving aggregations. By late June or early July aggregations of 80,000 or more caribou on the 1002 area are common. Dense clumping or aggregations and increased movements occur when weather conditions promote insect harassment. Postcalving movements show considerable annual variation. During insect harassment, caribou groups usually move rapidly towards the coast seeking relief on points, river deltas, mudflats, aufeis, large gravel bars, and barrier islands and in the shallows of lagoons (Fig. 3). Some groups also move to higher elevations in the mountains for relief. In other years there can be a gradual westward shift across the coastal plain and northern foothills.

The postcalving season is the low point of the annual physiological cycle when energy reserves of parturient cows are especially low. The stresses of winter, pregnancy, migration, birth, lactation, hair molt, antler growth, and insect harassment draw heavily upon this segment of the population (Dauphine, 1976; White and others, 1975). Access to insect-relief habitat and forage resources during this period may be critical to herd productivity. In early July the herds usually move east and south, vacating the 1002 area by mid-July. In certain years, residual groups numbering up to 15,000 animals have remained on the 1002 area and adjacent foothills and mountains through August. Occasionally, remnants of such groups (up to 2,000 animals) have wintered in northern mountains and foothills.

An international agreement for management of the PCH is currently being negotiated between the United States and Canada. The State of Alaska and Yukon Territorial governments as well as local users are active participants in the negotiations. The 1984 Western Arctic Land Claims settlement between Canada and the Inuvialuit in the Yukon removed a major obstacle to development of the agreement.

Harvest of the PCH occurs in both the United States and Canada. The harvest by individual Native villages is highly variable, depending upon herd movements. Recent harvests by the only village adjacent to the 1002 area, Kaktovik, have ranged from 25 to 75 animals from the PCH (Pedersen and Coffing, 1984). Harvest of the PCH throughout its range was estimated to be between 3,000 and 5,000 animals by LeBlond (1979). The harvest varies greatly between villages and between years within the same village. The annual harvest at Arctic Village, Alaska ranges from 200-1,000 (LeBlond, 1979). Annual harvest of the PCH within Canada averaged approximately 1,700 animals between 1963-1985 for the years in which data were available (Yukon Territory Wildlife Branch, unpublished data).

Central Arctic caribou herd. The Central Arctic caribou herd (CAH) has been increasing, and in 1985 numbered about 12,000 to 14,000. Its range is entirely north of the Continental Divide, from the Itkillik and Colville Rivers on the west to the Sadlerochit River on the east. The Trans-Alaska Pipeline, Dalton Highway corridor and Prudhoe Bay-Kuparuk oil fields lie within the herd's range. In July 1983, the herd was comprised of 46 percent cows, 21 percent calves, and 33 percent bulls (Hinman, 1985).

Females of the CAH wintering in the mountains and foothills near the western part of the 1002 area migrate north-northwest across the rolling uplands south of Camden Bay to the calving grounds on or near the Canning and Staines River deltas. A northward movement along the Canning River corridor also occurs.

CAH activity has been concentrated in two areas: the vicinity of the lower Kuparuk River and the Canning River delta. Most years as many as 1,000 females calve on the Canning River delta within the 1002 area (Fig. 4). Scattered, low-density calving extends as far east as the Sadlerochit River. Little or no calving has been observed in the TAPS-Prudhoe Bay oil field area since about 1973 (U.S. Fish and Wildlife Service, 1982; Whitten and Cameron, 1985).

After calving, some CAH caribou move southeastward, to the uplands south of Camden Bay. During the insect season (July) there is often a strong eastward movement along coastal habitats between the Canning River delta and Camden Bay (Fig. 4). An estimated 2,000-3,000 caribou of the CAH use the 1002 area (Canning River delta and coastal habitats along Camden Bay) for postcalving and insect relief. During the summer, an additional 1,000 animals may be scattered west of the Sadlerochit River and north of the Sadlerochit Mountains. Riparian areas are used for travel corridors as well as important spring and summer feeding areas. In late summer and fall CAH caribou are found scattered across the coastal plain south of Camden Bay, in foothills north of the Sadlerochit Mountains, and in uplands south of the Sadlerochit Mountains where they remain for the winter. During most winters, scattered groups of CAH caribou range throughout the 1002 area west of the Katakturak River and adjacent uplands to the south. The number of wintering animals ranges from 100 to 1,000.

The annual harvest of CAH caribou by Kaktovik residents has most recently been estimated to be 25-75 animals (Pedersen and Coffing, 1984). This harvest occurs along the coast during the summer when residents can travel by boat and inland during the fall and spring when snow-machine travel is possible.

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ALASKA
COALITION

'To Preserve Alaska's National Interest Wildlands'

July 10, 1987

Mr. Tom Williams
Senior Professional Staff
Committee on Energy and Natural Resources
U.S. Senate
Washington, D.C. 20510

Dear Tom:

Enclosed are the answers to questions submitted by Senators Domenici and Evans regarding the Arctic National Wildlife Refuge.

Please incorporate this information in the hearing record. Thank you.

Sincerely,

Tim Mahoney
Chairman

Enclosure

330 PENNSYLVANIA AVENUE, SE • WASHINGTON, DC 20003 • (202) 547-1141

ANSWERS TO QUESTIONS SUBMITTED BY SENATOR PETE V. DOMENICI FOR ENVIRONMENTAL PANEL

Q. 1. What makes the coastal plain unique from other State and federal lands set aside in Alaska?

Answer

While Alaska contains many spectacular and beautiful areas, the Arctic Refuge coastal plain is unique. One might compare the Brooks Range jutting up from the coastal plain to the Rocky Mountains rising from the High Plains. But unlike the Rockies, the view in the other direction is to the Arctic Ocean beyond the narrow plain.

The wildlife that gather on the coastal plain, such as the hundreds of caribou or the waterfowl that use the area for staging, are present in massive densities for such a polar ecosystemand are jammed against the related ecosystems in the mountainbs and the sea. This image of density is why the coastal plain has been called America's Serengeti, or compared to the Great Plains when bison roamed freely across the land.

In more prosaic terms, the U.S. Fish and Wildlife Service, calls the Arctic National Wildlife Refuge "the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the arctic ecosystems in North America." (Arctic Refuge Resource Assessment, page 46.) The Service calls the coastal plain (1002 area) "the most biologically productive part of the Arctic Refuge for wildlife and...the center of wildlife activity." (page 46.) These two factors make the coastal plain unique and irreplaceable among all other areas protected in Alaska by national park, wildlife refuge, or other conservation status.

Q.2. It appears that the Porcupine caribou herd is calving in Canada this year. Doesn't this indicate that the caribou are adaptable and that the concentrated calving areas are just a few of the areas that the caribou favor?

Answer

The Porcupine caribou herd has been following a migratory pattern for thousands of years. Given that the animals cover one thousand miles a year, crossing major rivers and mountain ranges, facing the uncertain conditions of spring break-up on the Porcupine River, and the storms of the Ogilvie Mountains, the Brooks Range and the Arctic coastal plain itself, the animals are remarkably precise.

When calving, the animals are also precise, not using the area east of Canada's Babbage River or west of Alaska's Canning River. These are the outer bounds of the ecosystem which they dominate. And not surprisingly, the Canning River thus marks the western boundary of the Arctic Refuge proclaimed by President Eisenhower in 1960. The Babbage River marks the eastern border of Northern Yukon National Park.

To say that in one year or another the animals use one portion of the calving grounds does not imply that the health of the herd depends on their historical area.

According to the Fish and Wildlife Service, the herd appears to use the Jago River portion of the coastal plain more often than some other areas with their overall caribou grounds. Major concentrations of calving have occurred there in seven of the last fifteen years. For this reason, the agency referred to a "core" calving area within the 1002 area. With normal variation in late spring weather, the upper Jago River would not likely be accessible to calving caribou over several consecutive years in a row. According to the educated guesses of wildlife biologists, this spring's weather resulting in the herd getting no further than Northern Yukon National Park, the herd's overall health apparently suffers when it is not able to reach the 1002 area. According to federal and state agency biologists, there is a 90% calf survival rate in the 1002 area, whereas there is only a 58% survival rate when forced to calve on the Canadian side of the border.

The differences in survival indicate that not only do the caribou use the 1002 area first and foremost, but that the herd's overall size and health would likely decline if industrial development forced the animals out of the area.

Incidentally, 100,000 caribou are on the 1002 coastal plain area as of this writing, having moved to these more favorable lands after calving.

Q.3. What environmental safeguards would you recommend accompanying any leasing?

Answer

No environmental safeguards could be imposed which would protect the wilderness qualities of the Arctic National Wildlife Refuge from being irreparably lost. The Fish and Wildlife Service found in its assessment of impacts to the refuge from oil and gas development that "loss of the area's wilderness character cannot be mitigated where oil exploration and development occur." (page 144.)

Even the Department of Interior's draft 1002 Report listed losses in populations for all of the major wildlife species despite its elaborate discussions of mitigation. The EPA could find no justification in the final 1002 report to claim more optimistic results.

Certainly Prudhoe Bay is neither a wilderness nor a wildlife refuge. Predators to the caribou have been eliminated. While this may result in some short-term gains for caribou as a managed game herd, the ecosystem has been destroyed just as the wilderness is destroyed.

ANSWERS TO QUESTIONS SUBMITTED BY SENATOR DANIEL J. EVANS FOR THE ENVIRONMENTAL PANEL

Q.1. How do you explain the increase in the Central Arctic caribou herd, which some thought would be harmed by development in the nearby Prudhoe Bay area?

Answer

As the 1002 Report points out, there are some vast differences between the Central Arctic herd and the Porcupine herd.

First is size: Despite recent increases in population, (other herds have increased as well in these years), the Central Arctic herd is only one-twelfth the size of the Porcupine herd.

Second is space: The non-migratory Central Arctic herd lives its life on a coastal plain three to five times as wide as that used for calving by the Porcupine herd. The contrast in densities is almost incomparable.

According to the 1002 report, construction activities in the Prudhoe Bay area did initially result in a disruption of calving by the Central Arctic herd, but the site was never an important calving area as the 1002 area is for the Porcupine herd. But the elimination of predators and hunting in the area have turned into at least a short-term plus for the herd.

According to studies conducted by Alaska Department of Fish and Game, the Central Arctic caribou herd has not experienced a decline in productivity or population because:

"(1) suitable alternative high-quality habitat appears available; (2) the CAH has been displaced from only part of its calving grounds to areas already used for calving; and (3) overall density of CAH caribou (even after displacement) is much lower than the density of other Alaskan Arctic caribou herds."

This information was cited in the Arctic Refuge Resource Assessment (1002 Report). The Fish and Wildlife Service also acknowledges that "the CAH has been exposed to minimal predation in recent years" mainly because "the wolf population in the central Arctic decreased in the mid-1970's as a result of illegal hunting. At that time the CAH numbers began increasing." The illegal hunting came with the influx of workers to the oilfields.

Just as the environmental community relies on the biologists' studies for information now about possible impacts to wildlife, so did the community during the debates concerning the development at Prudhoe Bay. Much uncertainty still exists after only fifteen years of studying the impacts resulting from industrial activity in the delicate arctic region of Alaska. For example, herds of herbivores without predators may suffer radical population declines in the future from disease or habitat alteration which would not occur in an undisturbed ecosystem.

Q.2. What is the potential for caribou dissipation, and what does that really mean (i.e. displacement of 3 miles, 5 miles)? At what point does displacement affect calving or mortality rates? What reports, studies or facts do you have on the potential impacts of caribou dissipation?

Answer

Caribou displacement as a result of oil and gas development has been reported by Dau and Cameron, 1985; Fancy, 1983; Urquhart, 1973; Wright and Fancy, 1980. Displacement of the Central Arctic Herd from historic calving grounds at Prudhoe Bay has been documented by Dau and Cameron, 1985, and Cameron and Whitten, 1979.

The Fish and Wildlife Service contends in the final 1002 Report that a three kilometer area around oil and gas development activities (roads, pads, processing facilities, et. al.) is not used by maternal cows. This results in the loss of 37% of the total coastal plain calving area, given the development scheme speculated by DOI. Maternal cows are most sensitive during and immediately after calving, and displacement could result in reduced productivity. Displacement during bond formation could increase calf mortality.

In an earlier draft of the 1002 Report, the Fish and Wildlife Service predicted a 20-40% decline in numbers of the Porcupine Caribou Herd because of its higher density on its concentrated calving grounds and because of the substantially greater area used for calving that may be developed.

But even these figures are only educated guesses. While one cannot make exact comparisons between herds or ecosystems on Alaska's North Slope, scientists have only this last undisturbed ecosystem to compare to the disturbance and mitigation which has taken place elsewhere on the North Slope. Most studies indicate substantial likelihood of massive caribou population decline as well as irreparable damage to the ecosystem. If this area is developed as well, we can only guess how a healthy Arctic ecosystem would function.

Q.3. The Canadian Government has indicated that they don't think we should drill, when in fact they have drilled along the coastal plain. Can you cite damage to the herd as a result of Canadian drilling?

Answer

To our knowledge, two exploratory wells were drilled on the Canadian portion of the coastal plain used for calving and which is now a national park, the Northern Yukon National Park. We know of no studies that were conducted to determine what if any impact on the caribou was incurred.

Massive Canadian oil and gas development has taken place east of the Park (and the ecosystem) in the MacKenzie Delta and offshore, mirroring America's development of the area west of ANWR and offshore.

The Canadian government has protected its caribou calving grounds and withdrawn all of the critical habitat in the Yukon Territory north of the Porcupine River from oil and gas development. These land patterns have occurred as part of the native claims settlement decisions of the Canadian government.

Q.4. It has been stated that Prudhoe Bay has "had substantial negative impacts on wildlife, including the virtual eradication of wolves and bears, the principal predators of caribou." Can you produce a study or facts to back up this allegation? It is my understanding that no firearms are allowed on the Prudhoe Bay field. Why shouldn't I assume that Natives and disease have been the culprits of the predator decline?

Answer

Contained in the final 1002 Report is this passage on page 121:

> The CAH [Central Arctic Herd] has been exposed to minimal predation in recent years. With the influx of workers and use of the Dalton Highway for Prudhoe Bay

development, the wolf population in the central Arctic decreased in the mid-1970's as a result of illegal hunting. At that time CAH numbers began increasing. The wolf population has remained low and brown bears, which also prey on caribou, are only moderately abundant in the area.

Biologists and others widely recognize industrial development as being incompatible with such species as wolves and grizzly bears.

Q.5. What _is_ the environmental degradation at Prudhoe Bay? What facts do you have to back up allegations that Prudhoe Bay is "producing half as much air pollution as New York City", and that water pollution from its oil spillage and toxic chemical waste is spreading out through the flat wetlands of the tundra?

Answer

The jury is still out on the pollution impacts of oil development at Prudhoe Bay, Kuparuk, Milne Point, and other areas where exploration or pilot projects have occurred. A lack of monitoring and enforcement by responsible government agencies is the cause for the paucity of information. In fact, two years of self-monitoring by the oil companies are the only data base anyone has for assessing pollution impacts of development in the arctic.

It is known, however, that current permits issued by the Department of Environmental Conservation allow the emission of 80,000 to 100,000 tons of nitrogen oxides per year. This amounts to more than the entire state Maine, according to that state's records for 1985. Additionally, the oil industry itself readily admits that overflow from waste pits routinely seeps onto the tundra wetlands. Studies regarding the effects of this seepage were initiated only two years ago.

Attached are pages 4-7 of the May 22, 1987 report by the Congressional Research Service with its references to pollution. We anticipate a new pollution report on Prudhoe Bay to be made available in July.

Q.6. Few people are actually able to travel to the coastal plain to enjoy its pristine ecological value. Assuming for the purpose of this question that it was determined there were no grave detrimental impacts to the area's environment and wildlife, why shouldn't we open the area, and use a percentage of revenues to purchase or enhance various environmentally valuable lands throughout the United States, where a greater portion of our population would be more likely to take advantage of the education our environment provides?

Answer

The argument that "no one uses" a particular place has been used to oppose many -- perhaps most -- pristine land withdrawals from Yellowstone National Park in 1872 to some of the national forest wilderness areas Congress set aside in the 1980's.

Yellowstone or even Shenandoah National Parks were not set aside originally because they had a history of attracting visitors. After all, Yellowstone was much more isolated and less visited in 1872 than the Arctic Refuge is today. But even though few could have anticipated the popularity measured by visitations that have followed, visitation was not the principal purpose in protecting these lands nor the value of which we are proudest today.

Are our wilderness lands less valuable than our city parks because fewer visit them? Are small easily accessible wilderness areas better than vast complete ecosystems? Is there anyone who thinks the land set aside by Congress in 1872 for Yellowstone was too generous and should be pared back?

While visitors are certainly not the first thing one thinks of in the Arctic Refuge, we would hesitate to underestimate their future impact if the area is protected.

While one cannot judge all of the impacts of development of oil resources in northern Alaska by the first fifteen years, one should examine the patterns. Pressure is building to open the Dalton Highway to public travel. Land exchanges are consolidating developable land along that corridor. We anticipate the day will come when developmental pressures will become much greater in Arctic Alaska.

And if the Arctic Refuge remains the only undisturbed ecosystem of its type, and if energy development industrializes more of Alaska's northern coast, how much more valuable will the area become for our country and for the world? If it remains America's Serengeti, how many would wish to visit it? One should be as far-sighted in protecting our last wilderness lands, our last ecosystems, as we should be in looking out for our future energy security. After all, wilderness is non-renewable also. And its value grows.

Data Needs

Some commentors argued that more data were needed before Congress makes a decision about the 1002 area. Among the factors which might be studied are not only the actual presence of oil, but also more analysis of predator and prey relationships, winter sources of water during the peak demand at exploration, a quantification of reserved water rights for Refuge purposes, and a detailed computerized mapping of resources. Congress may wish to consider whether agencies should be directed to gather more data as debate proceeds, or before a final comprehensive decision is made.

Policy Options for Long-term Plans Affecting FLEIS Conclusions

The FLEIS avoids, or contradicts itself on, the area's long-term future after production ceases in several decades. At least three future options seem possible: (1) the FWS would make strenuous efforts to restore the area to its natural state; (2) the area would be a base for production of onshore natural gas (which is not now economical); or (3) the area would be a base for offshore oil production. Restoring the area might require removing all hardware and eradicating roads, drilling pads, etc. Alternatively, the industrial base could be left, with an enlarged human population, roads, airfields, etc. Would restoring the area preclude offshore energy development? There is no assessment of secondary consequences of this policy option, since the choice is never clearly made.

AIR QUALITY

Conceivably, air pollution could have two kinds of long-term impacts on ANWR. First, air pollution during exploration and production might affect certain plant species, thereby changing the distribution of species beyond the time when oil extraction ceased. Second, air pollution might increase acid precipitation or contribute to arctic haze that could have post-production impacts. Either effect is speculative, and the chance of substantial effects resulting from emissions in this one area seems low; however, the cumulative air quality impacts of circumpolar development remains a subject of debate. Future studies at Prudhoe Bay and other North Slope oil fields might provide further information on air quality impacts, though limited predevelopment monitoring provides few baselines.

The FLEIS concludes that air pollution resulting from development of ANWR would be minor and transitory. Discussion is considerably expanded from the Draft, and includes one year (1979-1980) of available air quality data from Prudhoe Bay (included in the comments on the Draft LEIS by Standard Oil Company). Newly initiated monitoring at Prudhoe may provide further insights into potential air quality problems. One or more comments on the Draft LEIS identified the following air quality concerns:

Nitrogen oxides (NO_x). By far the largest emissions of air pollutants would be of NO_x. Although ambient levels would not be expected to exceed national standards, emissions might contribute to ozone formation, acid rain, and arctic haze. The FLEIS indicates that ozone formation would be minimal because of the low light levels most of the year; that acid rain is not a problem (though the report focuses on sulfur dioxide as a source, not NO_x); and that Prudhoe Bay emissions appear not to contribute to arctic haze (though the evidence is based on casual observation only).

Ozone. Although expected levels of ozone would be very low, at least one commentor expressed concern that it might nevertheless adversely affect plants in this fragile environment.

Total Suspended Particulates (TSP). Dust and fugitive emissions have, according to Prudhoe Bay data, occasionally exceeded ambient TSP standards during windstorms. However, the only comment in the FLEIS was that dust deposition on snow along roads caused early melting. Several commentors also noted that "start-up and upset flaring" produced black smoke, sometimes for weeks, but nothing was said of any particular adverse effects.

WATER RESOURCES

ANILCA added several explicit and primary purposes regarding water in ANWR. Section 302(1)(B) states that the purposes shall include ensuring "to the maximum extent practicable . . . water quality and necessary water quantity within the refuge." Quantification and adequacy of reserved water rights for ANWR in general and the 1002 area in particular would appear to be implied in this statement, but the FLEIS does not discuss the problem, even though oil exploration and development make significant demands for water. These demands may affect the physical and biological environment in two ways: through removal of water for industrial and domestic use, and through potential water pollution.

Water Supply and Demand. The FLEIS presents little information on anticipated water requirements for oil exploration, development, and production, although the volumes needed are apparently enormous, as much as 15 million gallons of water per exploratory well (p. 111). It acknowledges that water resources in the 1002 area have not been intensively studied, but provides little data to permit comparison of needs and supply.

Although no total water requirement estimates are presented, the FLEIS predicts that one-third less would be needed under Alternative B, limited leasing; presumably still less would be needed (the extent is not quantified) under Alternative C, the further exploration option.

The FLEIS states repeatedly that fresh water is limited in the 1002 area: only a few large lakes and shallow thaw lakes and a few accessible streams and springs are available in winter. The FLEIS states that, in the production phase, one or more plants to desalinate sea water would be built. However, it does not indicate where water for the peak demand during exploration and development would be obtained, nor are the impacts of a desalination plant discussed.

There are several options for increasing water supply: excavating deep pools in lakes, rivers, and streams; insulating ponds to prevent freezing; erecting snow fences to trap snow which could be used with snow melters; and converting gravel extraction pits to reservoirs. These methods have reportedly been successfully used for exploration and development elsewhere in the arctic, where fresh water resources are not as scarce, but supporting evidence is not presented. The FLEIS does not compare the physical and biological consequences of such methods for the 1002 area with other North Slope developments. The FLEIS takes the position that these are primarily engineering problems, while some observers contend that the issue has significant consequences that have not yet been addressed.

While solutions to water supply problems may be site-specific, a more thorough analysis of industrial and domestic requirements of potential water supply and associated environmental impacts is needed for informed decision-making.

Potential Water Pollution. The FLEIS finds that both full and limited leasing would have major effects on water quality. Major effects would encompass (1) "dedicated industrial use of the limited natural fresh-water sources" in the area and (2) potential for stream pollution lasting beyond the life of the project, due to construction and operations (including land erosion), as well as operational spills of oil and toxic materials. Effects on water quality are deemed unavoidable, lasting beyond the life of the project, and the most significant consequence for the physical environment.

The 1002 area is believed to be almost entirely underlain by permafrost, an impermeable zone beneath the surface, estimated at 800 to 1000 feet thick. Because water is held at the surface by the permafrost, about 99% of the 1002 area can be classified as wetlands, which serve multiple functions including providing habitat for fish and wildlife. Permafrost has two important effects on water issues. First, potential groundwater sources may be limited, since groundwaters beneath the permafrost are believed to be brackish. Second, toxic or hazardous waste spills would tend to concentrate above the permafrost zone, rapidly moving laterally to pollute rivers and streams, rather than percolating downward. The FLEIS does not analyze these issues or the potential effects of oil development activity on the permafrost, such as possible melting.

Wastes and Spills. Oil development and production involves many liquid wastes, such as brines, spent acids or caustics, corrosion inhibitors, and hydrocarbon products. Even in less fragile environments, proper waste disposal is critical. One key category of waste is drilling muds and cuttings. At other North Slope sites, water quality contamination may have resulted from leaching, breaching, or overtopping of reserve pits. The FLEIS recommends that such incidents be minimized by reinjecting drilling mud and other wastes where geologically feasible. It also indicates that solid wastes generated from oil development would probably require an incineration unit, a landfill, and an oily waste pit and that hazardous wastes should be removed to an approved disposal site. The likely volumes of hazardous and non-hazardous wastes are not identified, nor are locations for hazardous waste disposal or a solid waste incineration unit. However, a thorough siting analysis is a prerequisite for minimizing environmental damage.

The full leasing, limited leasing, and further exploration alternatives in the FLEIS predict an "unknown number (possibly hundreds) of minor spills (diesel fuel, oil, antifreeze, etc.)" from vehicle and equipment operation, likely to cause contamination of water. While the FLEIS terms these spills unavoidable, it also predicts that cumulative effects would not be significant, based on North Slope experience. The oil industry asserts that past spills were cleaned up quickly and that no major, cumulative impacts occurred. Thus, this experience is a model for future development in the 1002 area. Other observers dispute industry's claims.

Possible Effects of Quantity and Quality Concerns. The necessary water removal and possible pollution could have significant impacts on aquatic and marine species and special habitats.

Marine Mammals. Recent studies show that endangered bowhead whales do not mature and reproduce as early as previously thought. Additional precautions to prevent offshore impacts of petroleum development in the 1002 area are not outlined in the FLEIS, but may be required to increase protection afforded this species.

Fish. Effects on freshwater and coastal fish result primarily from (1) physical alteration of aquatic habitat (water withdrawal in critical areas at critical times, blasting, gravel removal and resulting increased sedimentation, creation of stream barriers through poor culvert design, water intake structures, and stream channelization, and of coastal barriers through erection of marine docks and causeways, etc.); (2) increased mortality from blasting and angling; and (3) chemical alteration of aquatic habitats (oil spills, drilling mud contamination, sewage and wastewater disposal, other contaminants, etc.).

The FLEIS understates the substantial winter concentration of freshwater fish in the extremely scarce unfrozen water. Suitable overwintering habitat for freshwater fish is very restricted in the 1002 area, and the environmental significance of oil development on this unique situation has not been studied extensively. Since winter habitat is severely restricted, unimpeded migration of fish to and from overwintering sites is crucial to population survival within each drainage system.

The FLEIS addresses chemical habitat alteration, but aquatic habitats in this area are so fragile and arctic fish populations so minimally productive that any accident could have significant long-term impacts.

Special Aquatic Habitats. Sadlerochit Spring is "one of the largest perennial springs on the North Slope" (p. 19). It is an overwintering habitat for fish, and the northernmost limit for many plants and birds; it is used year-round by muskoxen. In the exploratory phase, pressure to use this water may be intense, especially since there is no salt water alternative nearby. The FLEIS proposes no surface occupancy for energy exploration or development, but does not clearly address water withdrawal. However, references in the Draft LEIS (p. 104) to studying permissible and safe water withdrawal have been removed in the FLEIS. Whether this suggests that withdrawal may be permitted, but without such a study, or whether the removal means that it would be forbidden, is not clear. Allowed or not, water "poaching" may occur. The FLEIS neither discusses enforcement of regulations in this area, nor compares any needed regulations with experience at other arctic sites.

Appendix II

Additional Material Submitted for the Record

American Institute of Merchant Shipping

1000 16th Street, N.W., Suite 511, Washington, D.C 20036-5705
Telephone (202) 775-4399 Telex 89424 AIMSHIP WSH

June 11, 1987

The Honorable J. Bennett Johnston
Chairman, Committee on Energy
and National Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

The American Institute of Merchant Shipping (AIMS) is a national trade association representing 23 U.S.-flag shipping companies which own or operate approximately eight million deadweight tons of tankers, dry bulk carriers and other oceangoing vessels engaged in the domestic and international trades of the United States. We would like to submit this brief statement for the record in the Energy and National Resources Committee hearings on oil and gas leasing on the coastal plain of the Arctic National Wildlife Refuge (ANWR) in Alaska.

As a representative of the vast majority of U.S. tankers involved in the carriage of crude oil and petroleum products, we are pleased to have this opportunity to submit this statement in support of the recommendation to make the entire coastal plain available for oil and gas leasing with the necessary environmental safeguards.

Our brief comments will discuss the effect that an oil find in this region will have on the U.S. tanker fleet. We leave it to other more qualified parties to discuss the environmental impacts of the drilling for and land transportation of oil. On behalf of American tanker owners, we are proud of the outstanding environmental record established by our ships in transporting Alaska North Slope (ANS) crude oil to markets on the mainland. We believe this record should be used in assessing the environmental impacts of the continued carriage of ANS crude and the carriage of ANWR oil when and if developed.

Set out below are some salient facts indicating the excellent safety and environmental record of petroleum transportation by U.S. tankers in the domestic trades.

- The Port and Tanker Safety Act of 1978 has been implemented, requiring segregated ballast tanks, crude oil washing systems and inert gas systems on all tankers over 20,000 DWT, as well as numerous other improvements.

- The reliability of shipboard equipment has been greatly improved in recent years with the advent of satellite-assisted navigation, improved radar, and redundant steering mechanisms.

- The implementation of MARPOL '78 insures that discharges at sea do not occur, and that adequate waste reception facilities are provided.

- In three years (1981-1983), one of our largest operators lifted 45 million barrels of crude by tanker from Santa Barbara Channel spilling only one gallon.

- In the first seven years that the Trans-Alaskan Pipeline System (TAPS) was opened, tankers moved over three billion barrels of crude oil out of Valdez. Approximately 200 barrels have been spilled, which is equivalent to 67 barrels per billion barrels of oil shipped and a large portion of the amount spilled was recovered. No adverse environmental impact has been noted.

- Tankers have been transiting Santa Barbara Channel for well over 80 years. To our knowledge, no significant spills involving permanent environmental damage have occurred.

- One large oil company reports no spills since the inception (in the mid-1970's) of lightering operations in the U.S. Gulf from large (VLCC or ULCC) tankers to small tankers. Over 600 lighterings have occurred; these operations are far more difficult than loading from a single anchor leg mooring (SALM).

At present, there are somewhat less than 10 million DWT of tankers active under the U.S. flag. About 70% of this total is employed in the distribution of ANS crude as U.S. flag ships must be used under Jones Act requirements. These tankers form a vital part of the merchant marine which the U.S. can call upon in time of emergency to carry petroleum products. Fortunately, the ANS crude market at this time is supporting these vessels and the manpower base necessary to run the ships. However, as the production in the Prudhoe Bay oil fields declines, vessels will be forced out of this trade with little prospect of finding cargoes elsewhere. The vessels would be laid up or scrapped which will result in an exacerbation of an already acute shortage of militarily useful tankers. We would add that lay up status does not guarantee that competent crews will be readily available if it becomes necessary to break the vessels out for an emergency. Approximately 50% of the tanker manpower base is found on the vessels transporting ANS crude. A commercial market which utilizes ships is the only guarantee that ships and men will be available when needed for the national defense. A continued use of the TAPS systems by directing any oil found on the coastal plain into TAPS is a logical, environmentally sound method to proceed. TAPS and tankers have provided a safe method of transporting ANS crude and their use should be continued.

Other supporters of a decision to open the Arctic National Wildlife Refuge coastal plain to exploratory drilling and hopeful eventual development of oil fields will refer to the positive aspects of replacing the 20% of present domestic oil production represented by the Prudhoe Bay oil. To the considerable extent that this adds to the national security of the U.S., we add the very consequential benefits of keeping the major portion of the U.S. tanker fleet at work and available. This fleet operation provides major economic and national defense benefits for the United States.

The alternative to the development of ANWR is really unacceptable because, among other things, it would result in the idling and subsequent destruction of the existing infrastructure (tankers, the Trans-Alaskan Pipeline, etc.). This would be an unjustifiable waste in any circumstance, but especially in these days of emphasis on conservation of resources and on U.S. productivity.

We appreciate this opportunity to comment for the record and strongly support opening the coastal plain, representing 1.5 million acres of the 19 million acre Arctic National Wildlife Refuge, to oil and gas development.

Sincerely,

Ernest J. Corrado

Ernest J. Corrado
President

STATEMENT BY DERRICK CRANDALL, PRESIDENT, AMERICAN RECREATION COALITION, FOR THE UNITED STATES SENATE SUBCOMMITTEE ON PUBLIC LANDS, REGARDING OIL AND GAS EXPLORATION AND DEVELOPMENT IN THE 1002 AREA OF THE ARCTIC NATIONAL WILDLIFE REFUGE, SUBMITTED IN CONJUNCTION WITH HEARINGS HELD JUNE 4, 11 AND 12, 1987.

Mr. Chairman and Members of the Subcommittee on Public Lands, I am pleased to provide comments regarding leasing of the Coastal Plain of the Arctic National Wildlife Refuge for oil and gas exploration. My name is Derrick Crandall, and I serve as President of the American Recreation Coalition (ARC). ARC is a federation of nearly 100 corporations, associations and organizations comprising a major portion of our nation's outdoor recreation community. Our members include active groups of outdoor enthusiasts, such as the American Youth Hostels and the American Motorcyclist Association, trade associations representing thousands of manufacturers, such as the National Marine Manufacturers Association and the Recreation Vehicle Industry Association, equipment manufacturers like The Coleman Company and Huffy Corporation, and recreation service providers such as the Conference of National Park Concessioners and Walt Disney World.

All ARC members share a common concern about America's energy resources. In fact, energy was the central issue which brought about formation of the Coalition in 1979. Recreation was a major victim during the '73-'74 and '79-'80 energy crises, when certain government officials displayed a hostile attitude toward the consumption of energy in leisure pursuits. Gas shortages made travel to recreation sites difficult, limiting recreational choices and delivering a severe blow to the many small businesses serving the travelling public. A proposed ban on weekend motorboating had disastrous effects on the marine industry, and significant problems were experienced in the recreation vehicle, campground, skiing and resort industries.

The availability of adequate liquid fuels at a reasonable cost is vital to all travel and to nearly all forms of outdoor recreation. The American Recreation Coalition has adopted a comprehensive energy policy which addresses the needs of the recreation community. The major elements of this policy are:

- opposition to any government policies or actions which impose discriminatory energy restrictions on specific recreational activities;
- support for voluntary conservation efforts;
- support for the development of a mix of dependable energy resources at reasonable prices; and

- support for programs to encourage conversion of stationary uses of liquid fuels to other energy sources in light of the special importance of liquid fuels in moving people and goods.

We see trouble on the horizon once again if key decisions to protect America's long-range energy security are delayed. Today, because oil is plentiful and cheap, initiatives to encourage conservation have declined and efforts to increase our energy independence have fallen dramatically. Oil imports have increased 24% since 1985, with some experts forecasting as much as a 50% dependency upon imported oil by 1990. These trends and projections are very disturbing. Congress should not delay -- or wait for the next crisis -- before making decisions which will secure America's energy future. Our best energy reserves lie under the ocean floor and under the frozen tundra of Alaska, areas which take ten to fifteen years to bring into production.

The members of the American Recreation Coalition believe that a strong domestic energy program is one means to prevent future supply disruptions. We have been actively involved in educating our members about America's energy resources, sponsoring energy seminars and trips to an offshore platform in California and to the North Slope of Alaska. Two groups of recreation community leaders have toured the Prudhoe Bay production facilities and many saw firsthand the area now under consideration in the Arctic National Wildlife Refuge. We have engaged in discussions with a variety of experts over the future of our domestic energy program and ways to decrease our reliance on volatile foreign imports.

The 1.5 million acre Coastal Plain of the 19 million acre Arctic National Wildlife Refuge represents the best potential domestic on-shore source of oil in all of North America. Interior has estimated that as much as 9.2 billion barrels of oil could be commercially produced in ANWR.

North Slope oil is already playing a major role in supplying America's energy needs. Prudhoe Bay pumps 1.5 million barrels of oil per day -- 20% of our domestic energy production -- down the Trans-Alaska Pipeline (TAPS) to Valdez. But Prudhoe Bay's production will steadily decline after 1987. Oil extracted from the Coastal Plain could replace that which we use from Prudhoe Bay today, and the infrastructure to get it to market -- TAPS -- is already in place.

Members of the American Recreation Coalition do have a high level of concern over the possible environmental impact of oil exploration and production in the Arctic National Wildlife Refuge. For that reason we were fortunate to have the opportunity to see Prudhoe Bay, and were reassured by the high level of environmental concern shown by the oil companies, and by the research they have sponsored. The solutions they have found to effectively deal with the harsh climate and to prevent harm to the wildlife and the Arctic tundra were extraordinary.

Facts show that the caribou herds indigenous to the area have steadily increased in size since the presence of oil drilling and treatment facilities. Many species of birds and animals continue to spend the summer months in the area with no apparent impact on populations. During our visit to Prudhoe in early June, we saw a surprising array of wildlife wandering among the facilities. Caribou were feeding alongside a collection center; tundra swans were floating on the ponds formed by the melting ice; and scores of birds including ducks and geese were flying about, nesting and feeding on the lakes between buildings. Constant monitoring of the wildlife, extensive and costly mitigation efforts, and the implementation of new production technologies, indicate the oil industry is sincere in its commitment to minimizing environmental impacts.

Today, most of the Arctic National Wildlife Refuge -- 17.5 million acres -- is protected by Wilderness status. These areas do not contain the oil reserves our country needs to maintain a strong domestic energy program, and we can see the wisdom of protecting the qualities of the mountain wilderness of the Brooks Range south of the Coastal Plain.

However, the 1.5 million acres of the 1002 area -- unique for its potential to contribute so greatly to this nation's energy security -- should remain open for future energy exploration and development. We support the Department of the Interior's recommendation to Congress for full leasing of the Coastal Plain.

Attached to this testimony is an editorial which appeared in the June issue of RV Business, giving strong support for ANWR leasing. It was written by a recreation community leader and journalist who visited Prudhoe and ANWR this year to learn more about the issue. I request that it be included in the official record for these hearings.

Congress should also consider the great contribution revenues from Outer Continental Shelf leasing have made to the conservation of our natural resources through the Land and Water Conservation Fund. A similar program in ANWR could continue the important job of protecting sensitive lands. A portion of lease revenues from ANWR should be dedicated to building a permanent legacy for future generations of Americans through the purchase of key natural areas, such as wetlands in the lower forty-eight states, that are threatened by development or other factors.

Few are more concerned about or more dependent upon the quality of the lands and wildlife than the recreation community. We are committed to the protection and enhancement of America's natural resources. In the case of the Coastal Plain of the Arctic National Wildlife Refuge, we believe that the natural environment will not be sacrificed if oil and gas exploration and development are permitted.

Derrick A. Crandall, President
American Recreation Coalition
1331 Pennsylvania Avenue, NW, Suite 726
Washington, D.C. 20004
(202)662-7420

STAFF

Co-publishers/John Thompson, Michael Schneider
Executive Editor/Katherine Sharma
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Director of Technical Services/Bill Estes
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29901 Agoura Rd
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COMMENTARY

In Support of Alaskan Oil Development

We should begin development now when we can best balance environmental and energy concerns.

Early this month, I had the opportunity to join a group of RV industry leaders on a trip to Alaska's North Slope. The occasion was a tour, arranged by the American Recreation Coalition (ARC), of the controversial oil fields at and around Prudhoe Bay.

Specifically, the objective of the trip was to gather information about the Arctic National Wildlife Refuge (ANWR). The entire area consists of some 19 million acres, although only 1.5 million acres at the northernmost point are being sought for development.

Prior to my trip, the conflicting elements of this debate seemed clear: the need to develop more energy versus the concern for the environment. What I discovered after seeing the area firsthand, however, is that there really should be no controversy at all. The case for developing this small portion of ANWR is overwhelmingly supportive.

From a pure energy standpoint, it's no secret that our present energy supplies are dwindling rapidly. About a year ago, the United States was importing 31% of its oil. Recent months have seen an increase to more than 40%, and the American Petroleum Institute predicts that this figure could climb to more than 50% by 1990.

As far as the environment is concerned, the issue is much more simple than those opposed to ANWR would have us believe. While the oil companies have made their share of mistakes in the past, the successes reached in other North Slope areas clearly show that they are not insensitive behemoths running rampant in a pristine, idyllic countryside.

On the contrary, the coastal plain of ANWR represents some of the most barren land imaginable. For as far as the eye can see (which is, admittedly, not far because fog blankets the area much of the time), tundra and ice make the area almost uninhabitable.

Yet despite the isolated nature of the land, the care that's been taken in nearby Prudhoe Bay is testimony to the fact that big oil and the natural land can co-exist.

The entire pipeline project itself was built during the dead of winter in temperatures well below zero and when the ground was frozen solid in order to practically negate any effects on the environment. The pipelines were also built five to seven feet above the ground to allow the caribou to cross underneath and to ensure that the heat of the oil did not disrupt the delicate nature of the permafrost.

As a further example of the sensitivity that can be and has been exhibited in the area, much of the equipment used is almost mind-boggling in its lack of effect on the area. Large trucks that must travel across the native tundra are outfitted with huge balloon tires. These tires distribute thousands of pounds so delicately that a person could lie underneath the vehicles and walk away unharmed.

So if energy and environmental concerns aren't the problem, what's the issue? Old-fashioned politics is the answer.

The primary reason we're debating the problem in Congress is simply that a few special-interest environmental groups have rallied around ANWR to create a conflict, gather publicity and put themselves in the limelight to attract attention and, not too coincidentally, more members.

If these groups were truly concerned about the environment, they would see the need to proceed now in an orderly fashion with the exploration of this potentially huge oil reserve.

We're in a period of relative energy stability. However, if we drilled immediately in ANWR, it would take until approximately the year 2000 before consumers were able to use that oil. Yet postponing of that decision until an oil crisis is upon us guarantees there will be fewer restraints that now maintain environmental sensitivity.

The solution is clearly to begin development now—at a time when we can best balance the environmental concerns with the need to supply energy. Following that approach will ensure that both sides get what they want. Δ—*Michael Schneider*

AMERICAN TRUCKING ASSOCIATIONS, INC.

THOMAS J. DONOHUE
PRESIDENT AND
CHIEF EXECUTIVE OFFICER

2200 MILL ROAD
ALEXANDRIA, VIRGINIA 22314
(703) 838-1800

June 17, 1987

The Honorable J. Bennet Johnston
Chairman
Senate Energy & Natural Resources
Committee, Room SD-364
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

On behalf of the American Trucking Associations, Inc. (ATA), I would like to present the trucking industry's view on the exploration and development of the proposed opening of the Arctic National Wildlife Refuge (ANWR) for petroleum.

As you know, transportation in America depends almost exclusively on liquid petroleum fuels. An adequate and uninterrupted fuel supply is essential to meeting the nation's transportation needs and in particular, the needs of the trucking industry.

We support the goals of increased national energy self-sufficiency and reduced vulnerability to future energy disruptions. The proposal set forth by Secretary of the Interior Hodel outlines a workable plan in the exploration and development of the ANWR region in an environmentally conscious and sound manner. In order to meet our future energy needs and reduce our dependence on foreign suppliers, ATA strongly supports Secretary Hodel's proposal, and the opening of the coastal plain for petroleum resources development of the public lands in question.

In addition, ATA believes that the attachment of moratoria on Outer Continental Shelf (OCS) leasing (as have been initiated in the past by the House Appropriations Committee) serves only to hinder efforts in the rational development of important petroleum resources. Unless new domestic reserves are located and developed, dependence on foreign suppliers is likely to increase, thereby imposing serious risks on economic and national security as evidenced by the recent tragedy in the Persian Gulf.

In conclusion, ATA supports the opening of the coastal plain of ANWR to oil and gas development.

Thank you for the opportunity to comment on this important issue. Please let me know if I can be of further assistance.

Sincerely,

Thomas J. Donohue

TJD/amt

Amoco Corporation

Western Area
1670 Broadway
Post Office Box 800
Denver, Colorado 80201

Public and Government Affairs
303-830-4104

Representing
The Amoco Companies

E. Richard Brewster
Director, Western Area

June 18, 1987

The Honorable J. Bennett Johnston, Chairman
Committee on Energy and National Resources
United States Senate
364 Senate Dirksen Office Building
Washington, D. C. 20510-6150

Dear Senator Johnston:

Please include the attached statement of Amoco Production Company in the record of your June 12, 1987 hearing on the Arctic National Refuge, Alaska, Coastal Plain Resource Assessment. Thank you.

ERB/tje

Attachments

Testimony by Amoco Production Company
Senate Committee on Energy and Natural Resourses
Hearing on Arctic National Wildlife Refuge, Alaska,
Coastal Plain Resource Assessment
Washington, D. C.
June 12, 1987

Amoco Production Company agrees with the April 1987 recommendation to the Congress by Secretary of the Interior Hodel that the entire 1.5 million-acre 1002 area of the Coastal Plain of the Artic National Wildlife Refuge should be opened to an orderly oil and gas leasing program. We believe the Coastal Plain offers the best opportunity in the United States for the discovery of a major petroleum resource of sufficient size to make a significant impact in helping reduce America's growing dependence on foreign oil.

Amoco also urges the Congress of the United States to authorize full leasing of the 1002 area as soon as possible. Because of the long leadtimes to develop oil and gas fields in the Arctic - ten to fifteen years from discovery to first production - oil from the Coastal Plain is not likely to be available until the year 2000.

The study presented to the Congress identified a number of petroleum prospects on the Coastal Plain and the report estimates that the odds of discovering economically recoverable oil in the study area are 19 percent. In the petroleum industry those are

---

very good odds. Further, the report projects potential recoverable reserves up to 9.2 billion barrels - nearly the size of Prudhoe Bay, North America's largest field. Even though the Coastal Plain's potential cannot be fully evaluated without exploratory drilling, Amoco believes that the enormous potential of the area calls for timely leasing.

National security demands that this nation not miss or delay an opportunity such as the Coastal Plain to replenish its domestic petroleum reserves. It is well known that the dramatic decline in oil prices has led to greatly reduced domestic drilling activity. Rotary rig activity in the U. S. in 1986 averaged 964 rigs, less than half the level of 1985 and more than 75 percent below the 1981 peak. At the same time, prices stimulated energy consumption and oil usage in the U. S. rose about 3 percent in 1986.

Accompanying the drilling decline was a 22 percent increase in oil imports in 1986. If this present trend continues, this country could well be importing 50 percent of its oil requirements by 1990 and 60 percent by 2000. In the energy crisis of 1974 the U. S. was importing only 36.7 percent of its oil; during the Iran cutoff in 1979, imports were 43.5 percent.

The American Petroleum Institute estimates that domestic oil and gas production of 8.7 million barrels today will decline to about 5 million barrels per day by the year 2000. To supply U. S.

demand in 2000, an additional 10 million barrels per day will be required either from new domestic discoveries and/or imports. This means the U. S. will be very vulnerable to serious supply disruptions in the 1990's unless significant new domestic oil discoveries are made.

There is no potential oil and gas province in the United States which holds more promise for major discovery than the 1002 area. However, in order to fully assess the value of the area, exploration must proceed.

There is certainly no reason to delay exploration for environmental reasons. The experience in the Prudhoe Bay area has proved that the petroleum industry can work in harmony with the environment. We especially agree with the statement in the assessment that exploration and development drilling impacts on wildlife on the Coastal Plain will be minor or negligible. The fact that the Central Arctic Caribou herd has tripled since North Slope oil development began clearly demonstrates that wildlife can prosper in an oilfield environment.

In conclusion, Amoco Production Company supports the recommendations of the U. S. Department of the Interior and urges the Congress to act soon to permit the leasing of the 1002 area of the Coastal Plain of the Arctic National Wildlife Refuge so exploration of the important potential resource area can begin.

# # #

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6130 Freeport Boulevard
P.O. Box 22505
Sacramento, CA 95822
(916) 422 1921
TWX 910 367 2375 API SAC

June 26, 1987

Senator J. Bennett Johnston, Chairman
Committee on Energy and Natural Resources
SD-364 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Johnston:

The Animal Protection Institute of America requests that the following comments concerning the Arctic National Wildlife Refuge Coastal Plain Resource Assessment be entered into the record of recent hearings in this committee. Having read the assessment, we are opposed to oil and gas development in the coastal plain of the Arctic National Wildlife Refuge (ANWR) as proposed by section 1002 of the Alaska National Interest Lands Conservation Act.

The Department of the Interior's selection of Alternative A -- "Full leasing of the 1002 area " -- completely ignores the findings of the U.S. Fish and and Wildlife Service that a long-term commitment to oil and gas development, production and transportation would inevitably result in losses in fish and wildlife resources, animals for subsistence uses and wilderness values.

The report minimizes the impact of development on the Porcupine caribou herd with the statement that the TAPS pipeline has had "minimal impact on wildlife resources" and assumes that development will have a similar effect on the Porcupine herd. We believe that this is not a valid assumption, since the Central Arctic caribou herd does not migrate from a winter range to a coastal calving area as does the Porcupine herd. The density of calving caribou on the Porcupine calving grounds is 14 times greater than the density of calving caribou on the Central Arctic herd's calving grounds.

continued ...

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Considering the reported displacement of calving Central Arctic caribou resulting from oil development at Prudhoe Bay, it is reasonable to expect that not only will displacement of calving occur in ANWR, but that displacement will be more severe due to the increased density of caribou on the ANWR calving grounds. If calving caribou are displaced, they will be displaced to habitat not conducive to successful calving which would result in a population decline for the Porcupine herd.

Immediately after calving, herds of caribou cows and calves form in the area south of Camden Bay (a proposed drilling site). These herds move constantly to forage and find habitat providing shelter from the millions of mosquitoes which hatch around calving time. Mosquitoes are a major cause of calf mortality. It has been demonstrated (Curatolo and Murphy, 1983) that mosquito-harassed caribou herds do not readily cross under elevated pipelines. The development of main and subsidiary pipelines south of Camden Bay would provide additional stress on the caribou at a time when it could not be tolerated, i.e., when newborn calves and their mothers have the lowest energy reserves of the year. We believe this would magnify the effect of calving displacement and lead to further decreases in the size of the Porcupine herd.

The Interior Department's recommendation also ignores the U.S. Fish and Wildlife Service finding that muskoxen -- a species sucessfully reintroduced to the Arctic Refuge -- could be affected adversely by the destruction of habitat values on nearly 75 percent of the areas heavily used for calving. A decrease in the productivity of muskoxen, due to displacement of calving activity, appears to be in direct conflict with ANWR's goal of encouraging a healthy growth of the muskoxen population.

As reported by U.S. Fish and Wildlife biologists in the assessment, other wildlife species will be impacted, some to a greater degree than others, but all will be adversely affected by direct oil and gas development, auxiliary activities and possible contamination from spills and leakages. To disrupt critical breeding areas of caribou, muskoxen and waterfowl, in order to recover an unsubstantiated amount of oil when producing wells are currently being capped throughout the United States, provides a weak argument for the full or partial leasing of ANWR at this time. Equally nonsensical is the practice of promoting oil drilling on the North Slope based on current and future consumption estimates, while proposals for energy conservation programs are tossed aside in favor of more consumptive uses.

The Animal Protection Institute of America takes a firm position that opening the Arctic National Wildlife Refuge to oil and gas exploration will set a precedent which opens other refuges and wilderness lands to expoitation detrimental to the health of native plant and animal species and is in direct conflict with the stated goals of the Department of the Interior and its divisions to protect and preserve these species as national treasures and for the benefit of the people of the United State and future generations.

We urge that the Arctic National Wildlife Refuge be designated as wilderness in order to preserve the uniqueness of this extraordinary area.

Sincerely,

Nancy D Hicks

Nancy D. Hicks
Director, Eastern Region
PO Box 57006
Washington, DC 20037
(703)528-5205

STATEMENT FOR THE RECORD FOR
THE SENATE ENERGY AND NATURAL RESOURCES COMMITTEE
BY BP ALASKA EXPLORATION, INC.

REGARDING EXPLORATION AND DEVELOPMENT OF THE COASTAL PLAIN OF THE ARCTIC NATIONAL WILDLIFE REFUGE

JUNE 12, 1987

BP Alaska Exploration (BPAE) appreciates the opportunity to present its views to the Senate Energy Committee. We also appreciate the effort the Committee is making to consider the important issues involved in the debate over whether to allow exploration and development of oil and gas in the Coastal Plain of the Arctic Wildlife Refuge. BPAE strongly supports opening ANWR to development, and respectfully urges the Committee to approve legislation which will accomplish this in a timely manner.

BP Alaska Exploration is a wholly-owned subsidiary of the British Petroleum Company (BP). BP's involvement on the North Slope of Alaska dates back to 1959. We were among the first companies to identify Alaska as an area of prime potential for oil exploration and were one of the original lease holders of a major portion of the Prudhoe Bay Field. A BP affiliate, the Standard Oil Company, developed and now holds the leases for that Prudhoe Bay acreage. BP is the second largest interest owner of the North Slope Kuparuk River Field, and owns a significant portion of the Trans Alaska Pipeline.

Based upon our extensive experience in Alaska, as well as BP's expertise as a major international oil company, we would make the following points which, in our opinion, demonstrate the importance of opening the Coastal Plain of ANWR to oil and gas exploration and development:

- BPAE believes that the ANWR Coastal Plain offers the best potential for finding any significant quantity of oil which remains in the unexplored areas of onshore or offshore Alaska. The Department of the Interior has concluded that in the Coastal Plain there could be as much as 30 billion barrels of oil. Of that, 9.2 billion barrels could be recoverable -- an amount almost equal to the Prudhoe field's ultimate potential yield. If an oil field is found in the Arctic, it must be a large field in order to be economically feasible to develop.

- The United States needs to assess its remaining oil resources and, more importantly, urgently needs to find new large fields. The political instability in other oil producing areas of the world illustrates the danger of depending on foreign fields for the future energy needs of this country. By 1990, imports are expected to supply at least 40% of U.S. oil consumption, compared with 27% in 1985.

The length of time needed to develop any oil field, complicated by the logistics of operating in the difficult climatic conditions of Alaska, add weight to the view that a decision to open the coastal plain for exploration should be made this year. The extreme weather conditions of the arctic area allow operators very limited time for conducting exploration activities, and therefore require companies to plan the exploration and development activities years in advance. If an economically feasible field is found, it would take from seven to ten years from the exploration phase to field development. This means if the Coastal Plain is available for leasing in 1988, it would be almost the year 2000 before the field could be depended on for full production.

Industry has proved that it is possible for major oil operations to be conducted in the Alaskan Arctic without causing unacceptable changes to the environment or to the natural habitat. The present state of the Prudhoe Bay Field, after ten years of oil company operations, and that of the Kuparuk River Field after six years of operations, is visible proof that oil exploration can be carried out in an environmentally sensible manner. The arctic experience and the advanced technology of the major North Slope operators, combined with the environmental stipulations required by the state and federal government, have resulted in oil development with minimal adverse effects on the land, the water and other environmental resources of the area.

In summary, the record shows that oil and gas exploration and development in Arctic Alaska is compatible with environmental protection. The opening of the Coastal Plain to exploration and development could be of enormous economic and national security benefit to the U.S. We therefore respectfully urge that the Committee support the leasing and development of the ANWR Coastal Plain.

Thank you again for the opportunity to present these views.

CARIBOU ENTERPRISES
DEBBIE AND DENNIS MILLER
P.O. Box 2648
Fairbanks, AK 99707 (907) 479-2189

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June 30, 1987

Representative Morris Udahl
Representative Walter Jones
Representative Lindsay Thomas
Representative Don Young
Senator Bennett Johnston
Senator Ted Stevens
Senator Frank Murkowski

Dear Gentlemen:

Enclosed is some information relating to the Arctic National Wildlife Refuge oil development issue. I am pleased that the recent Library of Congress report and the Environmental Protection Agency have pointed out some of the many deficiencies of the coastal plain resource assessment (1002) report to Congress, particularly with respect to cumulative impacts from oil and gas development, hazardous waste disposal, and related water and air quality issues.

It is a myth that the oil industry has had a beautiful track record at Prudhoe Bay. You may already be aware that the State of Alaska's Department of Environmental Conservation did not regularly monitor the the Prudhoe Bay oil filed, now encompassing a 900 square mile zone, until 1982. Prior to 1982 there was virtually no monitoring of hazardous waste disposal, oil spills, and air quality.

In recent years it has been reported by the Department of Environmental Conservation and the U.S. Fish and Wildlife Service that there are some serious environmental hazards associated with the disposal of drilling muds containing toxic wastes. Tundra ponds lying in the vicinity of drilling pads have been found to be contaminated. These ponds support a diversity of aquatic species and birds. And yet, the oil industry is currently exempt from hazardous waste disposal laws when it comes to the disposal of drilling muds (in 1980 Congress amended the Resource Conservation and Recovery Act to exempt the oil industry, see enclosed article).

How can we consider developing our only Arctic National Wildlife Refuge when the oil industry is not required to properly dispose of toxic wastes associated with drilling muds? This is a major environmental problem that has barely been addressed.

of words, wings, and wilderness

This is not merely a caribou vs. big oil issue. The Porcupine caribou herd may or may not be able to adapt to oil development. Nobody really knows. We do know that cow and calf caribou tend to avoid pipelines, roads and associated traffic. We do know that there are serious environmental hazards associated with oil development: thousands of oil spills at Prudhoe Bay, water contamination from hazardous wastes, and increased air pollution contributing to Arctic haze. We have no business sacrificing the refuge for short term oil supplies.

I have also enclosed a memorandum from the U.S. Fish and Wildlife Service which no longer exists. This document was supposedly shredded. The memorandum points out the shortcomings and major concerns relating to the 1002 report. The document was written by the field supervisor of the Northern Alaska Ecological Services of the USFWS. Read this to gain a better understanding of the major environmental problems at Prudhoe Bay and shortcomings of the 1002 report.

Another question which must be truthfully answered is the question of where the oil will come if we don't develop the Arctic National Wildlife Refuge. Is the Arctic Refuge our last hope? The answer is clearly no.

We can obviously pursue energy conservation measures which have worked in the past. However, please review the enclosed news clippings and note the following information:

1) The oil industry is sitting on the West Sak oil formation which contains potentially more recoverable oil than Prudhoe Bay, in excess of 20 billion barrels (this field lies in the Kaparuk River Unit, adjacent to Prudhoe Bay, state land). This field can be commercially developed by conventional means when the price of oil goes up (see Alaska Report article noting test well results on the West Sak field, January 28, 1987).

For many years the oil industry stated that they could not develop the West Sak field using conventional means. ARCO's test well project has proven this is not the case. There is more oil here than the greatest estimates with the Arctic National Wildlife Refuge! And we know it is there.

2) Although there are no large quanities of oil within the National Petroleum Reserve there are 5.9 billion barrels of in place reserves. Approximately three quarters of the known quanities lie in the eastern third of the reserve, in close proximity to the Colville River, and existing development within the Kaparuk River unit. Why not tap this area first since we know the oil is there and it is a petroleum reserve bordering existing producing fields (see map).

3) The State of Alaska's five year oil and gas leasing plan states that 13.5 million acres of onshore lands on the North Slope may be opened to oil and gas leasing. These lands are classified as having moderate potential. Why not develop these lands which are adjacent to producing fields before we consider giving away the refuge to the oil industry.

Simply put, the oil industry has plenty of onshore areas to explore and/or develop on the North Slope without developing our only Arctic Refuge. In addition to the onshore areas the industry has millions of offshore leases to bid on.

In summary, we have no business giving away the entire North Slope to the oil industry. We must preserve the Arctic National Wildlife Refuge in concert with the purposes for its establishment. The coastal plain is the most biologically productive area within the refuge. The Arctic National Wildlife Refuge is the largest and perhaps the most remote wilderness area existing in the United States.

I am a 12 year Alaskan resident. I have lived, worked and recreated within the Arctic National Wildlife Refuge for many of these years. I hope to meet with many of you during upcoming hearings or perhaps during your visits to the Arctic National Wildlife Refuge. Please feel free to call if you have any questions regarding the enclosed information. I have studied this issue closely.

Most of us in Alaska believe in balanced resource development. Developing the Arctic National Wildlife Refuge is not in keeping with balanced oil development on the North Slope. Believe me, if we open the refuge it is only for short term profits. It is hardly worth the sacrifice.

Sincerely,

Debbie Miller

Debbie S. Miller

cc: Henry Cole, Science Advisor to Governor Cowper

Oil, gas escape U.S. waste law

By BILL KELDER
Staff Writer

The state Department of Environmental Conservation says oil and gas exploration and production produces hazardous wastes, but the industry has been exempted from federal and state laws governing its management and disposition.

The oil industry says it produces little hazardous wastes and to be placed under those laws would economically devastate the industry here and nationally.

Exploration and production by the Alaska oil and gas industry generated approximately 69,000 metric tons of waste in 1984. Some of the waste is considered hazardous, according to the DEC. Comparable waste tonnages for 1985-86 are not available because federal law requires the reports on a biannual basis and DEC hasn't tallied the figures.

Most wastes generated by the oil and gas industry are on the North Slope and Kenai Peninsula, according to DEC.

The first federal hazardous waste law—the Resource Conservation and Recovery Act—passed Congress in 1976. In 1980 Congress amended it to exclude certain industries, according to Jeff Mach.

"Hazardous wastes come in all forms: solid, liquid and gas," said Mach, 34, who as a DEC environmental field officer, handles the department's hazardous waste management program for the state's northern region.

Businesses and industries producing such wastes are responsible for their safe storage, transportation, treatment and disposal. This can be costly, Mach said, because most hazardous wastes must be shipped to the Seattle-Tacoma area at a cost of up to $1,000-$1,500 per 55-gallon barrel of waste.

The federal law gives the Environmental Protection Agency authority to regulate the treatment, storage, transportation and disposal of hazardous wastes.

The oil and gas industry claims it produces few hazardous wastes and such wastes are mixed with sufficient volumes of non-hazardous material to make any risk low level. It also says the cost of complying with RCRA would be "economically devastating."

"That RCRA exemption is an appropriate exemption as there are not serious hazardous wastes associated with exploration and production in the oil and gas industry," said Alaska Oil and Gas Association executive director Bill Hopkins.

RCRA does allow EPA to authorize states to operate hazardous waste regulatory programs in lieu of the federal prog-

(See WASTE, Back Page)

GUNK AT PRUDHOE BAY—In 1983, the DEC took North Slope Salvage, Inc. to court for failure to maintain proper hazardous wastes storage. NSS is a private contractor which manages wastes for the oil industry on Alaska's North Slope. The scene shown here has since been cleaned up. *DEC Photo*

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Sunday, February 1, 1987

WASTE

(Continued from page 1)

ram and to adopt more stringent regulations regarding hazardous waste management and enforcement. Because of this the state Legislature, in 1981, approved Alaska's first hazardous waste law.

Like the federal RCRA law, the Legislature amended its law in 1984. The amendments were in a bill sponsored by the state Senate Natural Resources Committee chaired by Sen. Bettye Fahrenkamp, D-Fairbanks.

While the amendments are generally described as strengthening the law, one excluded the oil and gas industry from the law's provisions and DEC's regulations. Another excluded certain activities of the mining industry. Both amendments were similar to those Congress approved in 1980.

Mach says the federal exclusions resulted from heavy lobbying in Congress by the American Petroleum Institute. "With regard to the state hazardous waste law, it was lobbying by AOGA (the Alaska Oil and Gas Association)," he said.

The petroleum industry amendment covers "drilling fluids, produced waters, and other wastes associated with the exploration, development, or production of crude oil, natural gas or geothermal energy."

Wastes discharged by other industries—identical to those produced by the oil and gas industry—place the other industries under RCRA regulations, Mach explained.

"Methanol is a good example," Mach said. The oil industry uses a methanol/water solution with an anti-freeze, he said. "If you used it at an oil drilling or production site and generated methanol as a waste, it would not come under existing federal and proposed state regulations. But if any other industry generates it as a waste, it would come under the regulations," Mach said.

"There's been an awful lot of confusion on this issue in the public," said Hopkins. "The industry, through API, indicated to Congress that there wasn't a scientific reason for regulating exploration and production wastes.

"They also indicated that the wastes ran into such high volumes the costs of handling them under RCRA would have been devastating to the industry," he said. Compliance with RCRA in the first year would have cost the industry nationwide about $14 billion, "with ongoing costs of about $5 billion-$5.5 billion a year," Hopkins said.

With Alaska accounting for about 20 percent of national oil production, that would amount to about $1 billion a year from the state's oil and gas industry, he said. "It would be economically devastating to the industry here in Alaska, particularly in light of the current oil price

ka," Hopkins said. He said it costs the industry hundreds of dollars per (55 gallon) barrel to ship its wastes Outside.

If the industry came under RCRA, all the mixed wastes (hazardous with non-hazardous) would have to be handled by special hazardous waste disposal facilities, such as high-heat incinerators. "There are not enough waste dumps in the country to handle those volumes," Hopkins said.

Another industry successful in obtaining hazardous waste exclusions at both federal and state levels, Mach said, is the mining industry.

They are excluded under an 'extraction benefication' clause covering "processing of ores and minerals (including coal), phosphate rock and over burden from the mining of ore," Mach read from the regulations. This also excludes wastes from "heap leeching using cyanide solutions," he said. Other industries producing wastes containing cyanide solutions are under the federal and state regulations.

"The nuclear industry is also excluded from federal hazardous waste regulations," Mach said. Here again, other industries producing the same waste products would be under the RCRA regulations. Some functions of utilities are excluded as well.

The oil and gas exclusions apply to industry exploration and production activities only, Mach explained. Refining activities come under the laws, he said.

DEC is developing two sets of

JEFF MACH
DEC Waste Specialist

"The second area is not covered at all under federal laws and regulations," he said. "With regard to the EPA regulations on siting, you're only prevented from putting disposal facilities on a fault line or a flood plain. There's nothing to prevent putting a hazardous waste disposal area in the middle of downtown Fairbanks or Anchorage, and that's what we're (DEC) trying to correct."

He said there is a federal law regarding hazardous wastes that does apply to the excluded industries. "It's the Comprehensive Environmental Response Compensation and Liability Act of 1980, or CERCLA. Most people know it as the 'Superfund'," Mach said. "But

UNITED STATES GOVERNMENT

memorandum

U. S. FISH AND WILDLIFE SERVICE

TO: Deputy Assistant Regional Director, Habitat Resources, Anchorage

FROM: Field Supervisor, Northern Alaska Ecological Services, Fairbanks

DATE: 2/18/86

SUBJECT: Comments on ANWR Coastal Plain Resource Assessment

In response to your request of February 14, our major concerns with the subject document are summarized as follows:

1. For most of the potential impacts, mitigation measures are proposed as being able to reduce or eliminate the impact. Many of these measures have not been successful or have been totally unacceptable to industry (we can provide specific examples upon request). Since a decision to go with any alternative will undoubtably be made with the understanding that many of these measures will be implemented, the limitations should be clearly outlined in the report.

2. The document totally ignores cumulative impacts, including the impacts that development on ANWR would have off of the refuge lands (e.g., the pipeline to TAPS), the impacts that development off of the refuge will have on the refuge (e.g., development offshore and on KIC lands), and development that is unrelated to and/or does not overlap with activities on ANWR but will have effects on the same resources (e.g., oil and gas development within the range of the Porcupine herd in Canada).

3. There appears to have been inadequate coordination with ADF&G and NMFS on policies and restrictions applicable to oil and gas activities on state lands and offshore. Activities on the refuge may be contrary to policies of these agencies that FWS has actively supported elsewhere on the North Slope (e.g., gravel extraction, facility placement and design, consolidation of facilities). FWS should not be less restrictive on ANWR than has been the custom elsewhere on the North Slope.

4. Restrictions should be included as lease stipulations as much as possible to avoid future confrontations. However, the flexibility to change as new information on resources and mitigation becomes available should be retained (e.g., in the Colville Delta, the State lease stipulations are tied into a habitat classification that may not work in that area and they may be unable to protect the resources that the stipulations were intended to protect).

5. Water use will be a major problem that should be addressed comprehensively early in the planning process if leasing is approved. A water management plan that establishes water sources (e.g., gravel pit sites to be used as reservoirs, or a central desalinization unit) with a water distribution system should help avoid water use conflicts. If certain activities do not comply with the water management plan, they should not be permitted. These restrictions should be presented up front prior to leasing.

6. Chapter V describes the development of an oilfield that is basically a Prudhoe/Kuparuk oilfield superimposed over ANWR. The description is too qualitative and thus does not adequately illustrate the magnitude of activities associated with development of an oilfield. Information from Prudhoe and Kuparuk can be extrapolated to provide a quantitative description, e.g., miles of road, miles of pipeline, acres covered by gravel, acres covered by impoundments, number of drill pads, number of wells, number of gravel hauling trucks per X cubic yards of gravel/acres of gravel laid, acres of land lost to gravel pits, acres required for support facilities, traffic levels, number of reserve pits, miles of powerlines, estimate of culvert failures, and amount of fluid pumped from reserve pits to tundra and roads. A map to scale of Prudhoe/Kuparuk would also help.

7. Contaminants are totally ignored with the assumption that much of the area is not wetland and therefore it will not be a problem. In 1984, over 67,899,000 gallons of reserve pit fluids were pumped directly into tundra in Prudhoe Bay (does not include fluid sprayed onto roads). Of the 21 pits for which effluent data were reported, 20 violated one or more effluent standards. Waterfowl are frequently observed in and adjacent to reserve pits and shorebirds feed adjacent to pits in areas that have obviously been affected by seepage. The effects of these contaminants on these birds and the food chain are unknown. Contaminants are a major issue that deserves more attention.

8. Oil companies are continually changing plans depending upon economics and frequently cite environmental concerns as making or breaking a project. It would be helpful to get strong and binding commitments, prior to development, to follow through with mitigation regardless of field economics.

9. There is a lot more information available from the baseline studies than has been included in the report. This information should be used to help guide decisions on oil and gas activities on ANWR.

10. The scale of the maps is woefully inadequate. Facilities on "alternatives" maps cannot be distinguished. The scale of the wildlife maps (Plate 1) makes them useless to a reviewer, particularly since points of reference are not shown. A full set of small scale maps should be prepared, preferably in overlay format to assess resource values in combination.

11. The basis for differentiating between "full leasing" and "limited leasing" alternatives is entirely related to caribou. Other resource values such as migratory birds (NSSE, or National Resources, are not even mentioned) and other mammals should also be considered.

12. Endangered Species Act requirements both within FWS and with NMFS may not be met without Section 7 Consultation at the leasing stage. Following a lawsuit initiated by the North Slope Borough, the Section 7 Regulations were revised to allow an agency to take an incremental step (e.g., leasing) toward the completion of an action (e.g., development of an oilfield) that might affect a T & E species provided that certain conditions were met, one of which specifies that the Federal agency continue the consultation process with respect to the entire action and obtain biological opinions at each incremental step. According to the Coastal Plain Resource Assessment, marine mammals and the Arctic peregrine falcon may be affected by development of oil and gas on ANWR. Furthermore, whenever an EIS is being prepared for a Federal action, the Federal agency is required to complete a biological assessment to determine if T & E species will be adversely affected and if Section 7 Consulation will be initiated.

13. If Habitat Resources is providing any recommendations on selection of alternatives, we recommend that no immediate leasing be carried out at any level. Given that the geology is complex and estimates of recoverable oil cover such a wide range, including a low estimate that would likely be uneconomical to develop, the maximum oil and gas activity, if any, that should be permitted at this time is further exploration. Further consideration should also be given to excluding all or part of the area from leasing.

You also expressed concern regarding the estimates of dust deposition near roads that would be constructed in conjunction with the development of an oilfield on ANWR and pipeline to Pump Station 1. According to studies in the Prudhoe Bay area, along lightly traveled roads dust is generally deposited within 50 m. Along the more heavily traveled spine road, dust is noticeable up to 75 m from the road and is heavily deposited within 25 m. Along the Dalton Highway, dust has been deposited up to 300 m from the road. The amount of dust deposition and distance from the road is strongly influenced by wind direction and intensity.

Since the Coastal Plain Resource Assessment and our comments are considered proprietary, please delete this memo from the Dialcom file as soon as you have printed a hard copy. These comments should be used with descretion.

Arco Halts West Sak Project

Arco Alaska Inc has announced a halt to its two-year project designed to test production methods for the West Sak field in the Kuparuk River Unit on the North Slope. Arco began the project to determine if conventional recovery methods—in this case injection of hot water into the formation—would be effective in producing the heavier-than-normal crude. West Sak field is estimated to hold some 20 billion bbls of crude.

Arco President Harold Heinze said the project showed that conventional methods could be used in the field, but added, "It is obvious that oil prices will have to improve, with some assurance of continuing at a higher level, before our company would commit to development of the West Sak."

The West Sak reservoir covers about 250 square miles, primarily in the Kuparuk River Unit. Arco holds leases on about 50 percent of the field.

The average depth of the 16 wells drilled during the project is approximately 3,500 ft. Earlier, Arco estimated that some 5,000 wells would have to be drilled in the field to effectively produce the crude.

Baker-Hughes Merger Faces Possible Suit

The proposed merger of Hughes Tool Co and Baker International Corp of California would violate the Clayton Antitrust Act, according to an attorney for the U.S. Department of Justice. The Justice Department said it would sue to stop the merger of the companies, a combination agreed to by the boards of both companies last year.

The Justice Department cited its concern that the merger would reduce competition in the tri-cone rock bit and electric submersible pump market. The department has indicated that it would not oppose the merger if Baker were to divest itself of its rock bit and pump operations, according to Baker officials, who said that negotiations currently are under way with the Justice Department concerning the proposed merger. The two companies plan to merge in a stock-swap deal valued at more than $456 million, creating a new company to be named Baker Hughes Inc.

Cowper Presents Budget Plan...DNR Cuts Proposed

Alaska Gov. Steve Cowper gave his "State of the Budget" address to the Alaska legislature last week, outlining his plans to deal with an estimated $875 million budget deficit in Fiscal Year 1987 (ending June 30) and listing his proposed $1.88 billion budget for FY 1988.

Among other things, Gov. Cowper proposed budget cuts for most state agencies, the reimposition of a state income tax and a five-year suspension of the Economic Limit Factor (ELF), a measure which allows oil companies to apply for a reduction in severance taxes after a specified number of years following the opening of an oil field.

It's estimated that suspension of the ELF will generate $125 million for the state in FY 1988 and $150 million annually thereafter. The ELF is scheduled to go into effect for Prudhoe Bay in June.

Veronica Dent, a spokeswoman for Arco Alaska, noting that the ELF also was designed to promote the development of marginal fields, said, "Any increase in severance taxes or repeal of ELF would mean eventually some oil would be left in the ground." Dent also noted that by keeping the ELF in place, the state would benefit in the future from royalty and income taxes from production of marginal fields.

Chief among the state agencies that would see cuts under the proposed budget is the Department of Natural Resources. While that department's Division of Oil and Gas would be relatively unaffected by Cowper's proposals, the Division of Mining and Geological and Geophysical Surveys would lose 51 fulltime employees. In all, DNR would be reduced by 150 positions.

Laurel Murphy, acting director of the MGGS, said that staff positions responsible for seismic data interpretation and pre-lease sale analysis for offshore mineral leases would be eliminated. Geothermal projects—including the proposed project in Unalaska to supply residents there with power from steam from the Makushin volcano—also would be eliminated.

Miners who have claims on state land—there are some 49,000 such claims—also will be affected by the proposed budget, as a yearly report to the miners adjudicating those claims no longer will be provided by the state.

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(Continued from Page 1)

reached total depth at 12,750 ft and crews were cementing 9 5/8-inch casing at 10,082 ft. Nabors Alaska's Rig #22E was released and is stacked and available. Arco's 2T-7 at Kuparuk River field was drilled to 6,541 ft. Rowan Drilling's Rig #34 was moved off that site and currently is drilling near the 3,800-ft level at the 2T-4. The 3K-13 was drilled to 8,580 ft, total depth, and the rig was moved to the 3K-14. At the latter site, logs were run at a depth of 8,960 ft. Arco's LGI-2 at Lisburne field is a "tight hole."

Standard Alaska is drilling at 11,400 and 12,111 feet, respectively, at the Q-21 and O-29 wells in Endicott field. Nabors Alaska's Rig 18E is being used on workover operations at the F-9, while Alaska United's Rig #2 is being prepared to move to the G-32 after drilling the G-30 to a total depth of 9,816 ft. The S-19 reached total depth at 10,170 ft. Elsewhere, Far North Oil & Gas continues to test and evaluate the Mike Pelch #1.

Arco to Halt West Sak Sand Production Testing

A two-year project designed to produce crude from a formation estimated to hold more oil than the Prudhoe Bay pool will be halted at the end of the year, a victim of falling prices and high production costs.

Arco, which operates the project in the West Sak sandstone reservoir, said data analysis and delineation of the reservoir will continue until oil prices rise enough to justify production. The North Slope project involved the drilling of 14 closely-spaced wells into the relatively shallow pool above the Kuparuk reservoir. Hot water was injected into five of the wells to enhance the flow of the heavier-than-normal crude. Eight other wells were drilled as producers. Arco said test results indicate that as many as 5,000 wells would be needed to effectively produce the oil, which would have increased the company's reserves by two thirds. Standard Alaska and British Petroleum signed agreements to share the project's costs and information.

Repairs at Steelhead Platform Completed

Crews working on Marathon's Steelhead platform have completed repair operations and construction has resumed, according to a source close to the operation. Construction of the $100 million platform was halted June 1 after a 2,000-ton crane collapsed while installing jacketing at the site. Costs of the repairs were not disclosed.

Brown & Root USA Inc has resumed construction of the platform and has crews preparing to install girder beam tanks and piling. As part of ongoing inspections, Martech International was contracted to supply divers to perform inspections on the submerged portion of the platform. Using sophisticated electronic equipment and tactile inspection, the divers checked for punctures and overall structural integrity. The platform is designed to produce oil and natural gas and will be the largest of the 14 platforms now in Cook Inlet.

Arco Files to Export Cook Inlet Oil

Atlantic Richfield, parent company of Arco Alaska, has applied for a permit to export Cook Inlet oil. James Eason, acting director of the state Division of Oil and Gas, said the company has applied for a permit to export its daily production of 5,000 bbls of oil from Cook Inlet fields.

The export of Cook Inlet oil became possible after modifications allowing export were published in the Federal Register in June. Prior to the changes, the export of Alaska oil was prohibited. A ban on the export of North Slope crude is still in effect.

Atlantic Richfield must receive permission from the U.S. Department of Commerce to join the state as an exporter of Cook Inlet oil. The state began soliciting customers in Japan and South Korea last month for its 3,600 bbls per day of royalty oil and hopes to announce a buyer in early December.

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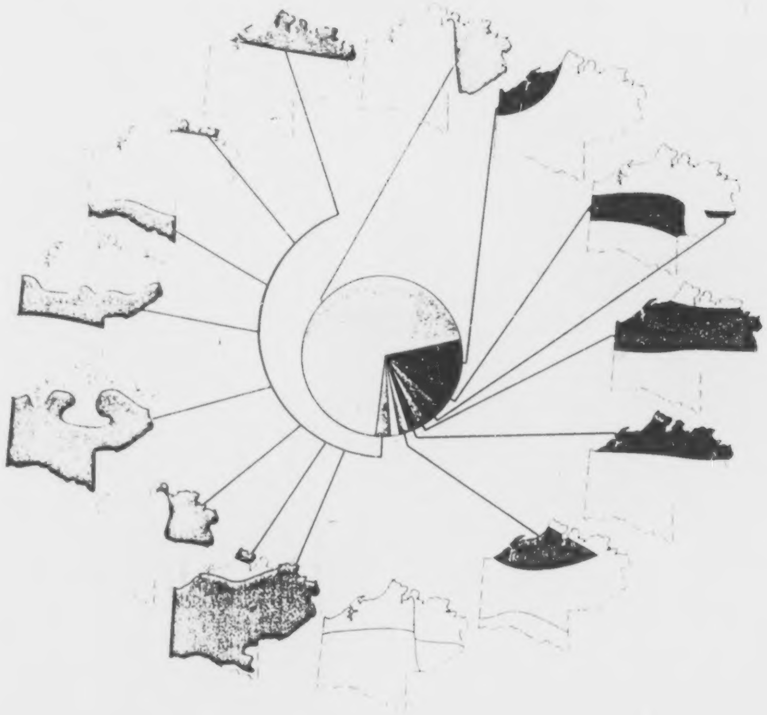
ESTIMATED AVERAGE AMOUNT OF OIL
IN PLACE FOR ALL OF NPRA
5.97 BILLION BARRELS



BLM - Geologic assessment of NPRA

The proportion of the average amount of oil contributed by each of the 17 plays assessed (shaded area).

Statement of the Chamber of Commerce of the United States

ON: UNITED STATES DEPARTMENT OF INTERIOR'S ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA COASTAL PLAIN RESOURCE ASSESSMENT

TO: SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

BY: SUSAN CONNOLLY MOYA

DATE: JUNE 12, 1987

The Chamber's mission is to advance human progress through an economic, political and social system based on individual freedom, incentive, initiative, opportunity and responsibility.

The U.S. Chamber of Commerce is the world's largest federation of business companies and associations and is the principal spokesman for the American business community. It represents approximately 180,000 businesses and organizations, such as local/state chambers of commerce and trade/professional associations.

More than 91 percent of the Chamber's members are small business firms with fewer than 100 employees, 58 percent with fewer than 10 employees. Yet, virtually all of the nation's largest companies are also active members. We are particularly cognizant of the problems of smaller businesses, as well as issues facing the business community at large.

Besides representing a cross section of the American business community in terms of number of employees, the Chamber represents a wide management spectrum by type of business and location. Each major classification of American business--manufacturing, retailing, services, construction, wholesaling, and finance--numbers more than 11,000 members. Yet no one group constitutes as much as 29 percent of the total membership. Further, the Chamber has substantial membership in all 50 states.

The Chamber's international reach is substantial as well. It believes that global interdependence provides an opportunity, not a threat. In addition to the 56 American Chambers of Commerce Abroad, an increasing number of members are engaged in the export and import of both goods and services and have ongoing investment activities. The Chamber favors strengthened international competitiveness and opposes artificial U.S. and foreign barriers to international business.

Positions on national issues are developed by a cross section of its members serving on committees, subcommittees and task forces. Currently, some 1,800 business people participate in this process.

STATEMENT
on
UNITED STATES DEPARTMENT OF INTERIOR'S ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA COASTAL PLAIN RESOURCE ASSESSMENT
for submission to the
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
by
Susan Connolly Moya*
June 12, 1987

The U.S. Chamber of Commerce appreciates this opportunity to express its support for the Department of the Interior's recommendation that Congress enact legislation making the entire Coastal Plain portion of the Arctic National Wildlife Refuge (ANWR) in northeastern Alaska available for oil and gas leasing, with necessary environmental safeguards.

The Chamber supports the Department of the Interior's recommendation to open the Coastal Plain of the ANWR to oil and gas development because the potential supplies would help to meet future energy requirements; strengthen the national economy; diminish U.S. dependence on foreign oil; create jobs; reduce the nation's huge balance of trade deficit; and provide a steady, large, and greatly needed source of income to the federal treasury.

The Chamber is concerned greatly about the adequacy and security of America's energy supplies. It is troubled by the fact that oil consumption in the U.S. has exceeded domestic production for more than 20 years and by projections indicating that the U.S. could be importing almost one-half of its oil by as early as 1990 under certain, not unrealistic conditions.

It is generally agreed that the 1.5 million-acre Coastal Plain in the ANWR contains the nation's most promising onshore frontier for major oil and gas prospects. Although expert opinion is divided over the size of the ANWR's petroleum resources, which is typical for any area before exploratory drilling, analyses of geologic studies and surveys predict a 95 percent chance of the Coastal Plain's containing more than 4.8 billion barrels of oil and 11.5 trillion cubic feet of gas and a five percent chance of its containing more than 29.4 billion barrels of oil and 64.5 trillion cubic feet of gas. No definitive data are available because current law prohibits even exploratory drilling in the ANWR Coastal Plain; therefore, estimates of the size of the reserves cannot be confirmed. Exploration is needed to make this range more definitive.

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*Manager, Energy and Natural Resources Policy

The Coastal Plain is prized not only for its oil and gas potential but also for its valuable wildlife. While the Chamber supports oil and gas exploration and development on the Coastal Plain, it cautions that extreme care must be taken to protect the valuable natural resources of this national treasure. It would encourage and support regulations based on the positive past experiences in arctic climates to ensure environmental integrity in all oil and gas operations in the area.

Experience shows that oil and gas development can be compatible with the Alaskan environment and wildlife. Petroleum operations on the adjacent Prudhoe Bay/North Slope coastal plain clearly demonstrate this. Based on the North Slope operations, the Chamber believes that oil and gas development would not adversely affect the Coastal Plain. In fact, technology and experience from North Slope activities will be used and improved in the ANWR.

Because of the 10 to 15-year lead time required for oil and gas development in the Arctic, steps must be taken now to encourage, with appropriate environmental safeguards, oil production on all of the most promising federal lands, particularly the Coastal Plain area of the ANWR.

We must keep in mind that authorizing the lease of the Coastal Plain for oil and gas exploration and development does not mean development and production today--rather it is an insurance policy for tomorrow. The recent gyrations of the oil market emphasize the need for a long-term view.

America's Energy Needs Are Growing, and Supplies Are Shrinking.

The U.S. relies on oil and natural gas to meet two-thirds of its energy requirements. The need for oil is growing; and efforts to develop alternative sources, such as synthetic fuels, have fallen short of expectations. Therefore, for the foreseeable future, oil must continue to be the principal fuel on which the nation depends.

The U.S. must find 32 billion barrels of domestic oil during the next 10 years to replace what is being used. In fact, three-quarters of the oil that the U.S. must have in the year 2000--just 13 years from now--still has to be found. Despite this fact, domestic oil production in the "lower 48" states, including offshore wells, has declined substantially during the past decade. And, due in large part to the oil price decline, experts predict that by the end of this year, domestic production will decline by as much as or more than a million barrels per day. In contrast, consumption is expected to continue to increase. Last year it grew by more than three percent, from approximately 15.7 to an estimated 16.2 million barrels per day, doubtless due to increased economic activity, population growth, lower prices, and perhaps due to other reasons.

Also troublesome to the Chamber is that American oil reserves, that portion of our resources that has been located with considerable certainty and that can be economically recovered with present technology, have been steadily shrinking. These are estimated to hit the lowest levels since shortly after World War II by 1990. All of the onshore basins in the U.S. with the greatest potential for giant fields have already been explored, except the Coastal Plain of the ANWR.

Since the U.S. began drilling for oil more than a century ago, it has produced about 50 percent of the estimated onshore oil and gas reserves and 20 percent of the estimated offshore reserves. Although America's Outer Continental Shelf, those lands beyond the three-mile state boundary, holds great promise, only 15 percent of all offshore drilling exploration wells have been successful. Because of this limited success, knowing what the potential oil and gas resources are in the Coastal Plain of the ANWR is more important than ever.

Oil Imports Could Double by the Mid-1990's and Cost Billions of Dollars Annually.

In October, the National Petroleum Council (NPC) issued an interim report entitled U.S. Oil and Gas Outlook in which the NPC presented the U.S.'s near-term and longer-term oil import outlook as going from grey to "utterly black."

Specifically, in sharp contrast to 1985 when U.S. imports of crude oil and petroleum products were only 27 percent of domestic consumption, the NPC study projects that, depending upon whether future prices follow a relatively low or a relatively high path, the acceleration in the decline of future domestic production, accompanied by even moderate increases in consumption, could result in imports of 35 percent to 50 percent of consumption by 1990, 45 percent to 60 percent by 1995, and 50 percent to 70 percent by the year 2000.

To put these figures in perspective, when the Arab oil embargo began in 1973, the U.S. was importing about one-third of its oil—about six million barrels per day. Despite drastic increases in oil costs, imports continued to rise to almost 10 million barrels per day by early 1977. After that, oil imports gradually declined to less than four million barrels per day by early 1983. Since that time, however, imports have surged; and today the U.S. is importing more than one-third of its oil requirements.

According to the American Petroleum Institute (API), U.S. oil imports from the Persian Gulf have increased by more than 400 percent during the past year. These imports accounted for 16.6 percent of total U.S. imports in December, 1986, versus only four percent in November 1985. This increased reliance on Persian Gulf oil seriously threatens the nation's energy and national security.

Petroleum imports represent a significant component of all U.S. imports. In 1983, 1984, and 1985, net payments for imported oil amounted to almost $53 billion--costing Americans an average of one billion dollars per week. Imported oil payments continue to be one of the largest factors in the U.S. trade deficit; last year they amounted to about one-third. According to the Department of the Interior's report, production from the Coastal Plain of the ANWR could reduce foreign dependence on oil and gas by almost nine percent in the year 2005 and save Americans billions of dollars per year.

Unless steps are taken now to increase development of domestic petroleum resources, the U.S. will become continually more reliant upon foreign suppliers. As long as the U.S. continues to import oil, it continues to export dollars and jobs.

Drilling for New Oil and Gas Is Critical Despite Current World Oil Surplus.

World oil prices are at their lowest in a decade, and oil companies--as a result of depressed earnings--are announcing reductions in their capital and exploration expenditures. Why then, with oil companies having less money to allocate, is it more important than ever that the Coastal Plain of the ANWR be made available for oil and gas exploration and development and not be declared as "wilderness," i.e., permanently closed to exploration and development, as has been suggested?

Experience tells us that when prices fall, demand inevitably rises, production declines, and the surplus disappears. America should not be lulled by the current surplus of oil in the world market; it must think of the future. The recommendation of the Department of the Interior that Congress enact legislation declaring the entire Coastal Plain available for oil and gas leasing is sound. Industry must be allowed to invest its limited financial resources most efficiently, i.e., in areas with the greatest development potential.

Unfortunately, the current talk of an oil "glut" has created the false impression that America need not worry about its petroleum or other energy supplies now or in the future. This has caused some to advocate that the U.S. delay energy development programs. However, those who propose the delay ignore the long lead time necessary for industry to find and produce energy sources. In the Arctic, this could mean as many as 10 to 15 years. They also ignore how the U.S.'s dependency affected it a decade ago and how it is affecting it now.

Other Benefits Would Accrue to the U.S. from Leasing the Coastal Plain of the ANWR.

Income to the U.S. Treasury. Revenues generated by petroleum exploration and development in the Coastal Plain would benefit not only the federal and Alaskan state governments but also the economy throughout the U.S. The Department of the Interior's report predicts that the net national economic benefits from oil production on the Coastal Plain will total $8.0 billion (present discounted value). The State of Alaska would receive a share of the federal revenue and an estimated $3.6 billion in tax payments related to leasing. In 1984, Alaska received about $1.4 billion in oil and gas royalties, rents, and bonuses.

Creation of Job Opportunities. Another benefit that would accrue from oil and gas operations is a boost in employment nationwide because supplies and services for such operations come from throughout the nation. Depending upon the amount of oil and gas discovered on the Coastal Plain, the API predicts that national employment gains would range from 138,000 to 1,021,000 jobs.

Environmental Concerns.

It cannot be overemphasized that the human use of the ANWR's resources must not be allowed to diminish its aesthetic and refuge values. The Chamber strongly supports the recommendation that the Secretary of the Interior be authorized to impose necessary and appropriate measures to protect refuge resources and ensure coordinated and efficient oil and gas activities, and it recognizes that developing the entire Coastal Plain of the ANWR could have some environmental consequences and would eliminate the "wilderness" character of that area. However, the most adverse effects could be mitigated by using the lessons learned and the technology acquired from development at Prudhoe Bay and from construction of the Trans-Alaska Pipeline. The evidence there showed that petroleum operations are compatible with the conservation of the land's natural values.

In discussing whether oil and gas operations should be permitted on the Coastal Plain of the ANWR, it is important to remember that the ANWR is only one component of an almost 90 million-acre National Wildlife Refuge System. By law, any activity occurring in a national wildlife refuge must be "compatible with the principles of sound wildlife management and will otherwise be in the public interest" (50 CFR Section 32.1). Experience in other refuges shows such compatibility.

A recent survey of oil and gas activities in 43 refuges in the contiguous 48 states, including 19 refuges with oil and/or gas production, found that oil and gas operations had little or no adverse effects on refuge wildlife or on other economic or recreational uses. This has also been true in Alaska in the Kenai National Wildlife Refuge and in sensitive areas of the North Slope.

Forty years of experience on the North Slope have demonstrated that oil development can and does exist in harmony with the environment. Techniques used to minimize disturbance include directional drilling, smaller and consolidated facilities, winter construction, use of temporary ice roads, use of special equipment, and elevated pipelines and facilities.

All activities on the ANWR would be monitored by the Fish and Wildlife Service, the State of Alaska, and the North Slope Borough. Moreover, if oil and gas exploration is allowed on the Coastal Plain, only a few, temporary drill sites of less than 10 acres would be required to verify commercial reserves of hydrocarbons. And, if a discovery is made, only a small area of the refuge would be developed.

According to API, the operating area in the Coastal Plain of a field the size of Prudhoe Bay would cover 130,000 acres, which would be about 8.5 percent of the Coastal Plain. The actual surface area affected by pads, roads, etc. would be approximately one percent of the operating area, less than 0.1 percent of the Coastal Plain.

Millions of acres in Alaska already have been leased and explored, and now the ANWR clearly has the most potential for major oil production. Exploration for oil and gas must take place where they may be located, not where we would like them to be. With the rapid rate at which our reserves have declined, exploring the most promising areas first only makes sense. The ANWR should be explored because it combines maximum potential with good access and an established nearby transportation facility.

Alaska already has vast "wilderness" areas. The Chamber believes that to withdraw such a prospect as the Coastal Plain for only a 2.6 percent addition to wilderness areas is not in the nation's best interests.

Conclusion

The facts are clear. Continued orderly oil and gas development, with appropriate environmental safeguards, is vitally important to the nation's energy and economic future. The discovery and development of the Coastal Plain's potential petroleum resources must be permitted. By the timely and orderly exploration and production of its oil and gas, the U.S. can assure future dependable supplies of energy for its homes, farms, factories, businesses, and transportation and for strengthening its economy, increasing federal revenues, providing jobs, and lowering its balance of trade deficit.

The alternative is to sow the seeds for an energy crisis in the 1990's. In the face of today's lower energy prices, the exploration budgets of oil companies are being slashed drastically, and wells are now being shut in by the thousands in the U.S. Meanwhile, lower prices are encouraging demand. If the U.S. allows these seeds to continue to grow, it will, indeed, have ignored the lessons of the 1970's and will reap a bitter harvest in the 1990's.

COALITION FOR AMERICAN ENERGY SECURITY

M. Isabelle Tapia
Executive Coordinator

June 5, 1987

The Honorable J. Bennett Johnston
United States Senate
136 Hart Senate Office Building
Washington, D.C. 20510

Dear Senator Johnston:

I am Isabelle Tapia, the Executive Coordinator of the Coalition For American Energy Security. The Coalition is a broad based national organization representing businesses, labor unions, trade associations, energy companies and other groups who are deeply concerned about our nation's declining domestic crude oil production and our growing dependence on insecure sources of foreign crude oil.

On behalf of our membership, I am writing you about one of the most significant energy policy and national security issues of recent decades. The issue is the future status of the 1.5 million acre area known as the Coastal Plain of the Arctic National Wildlife Refuge (ANWR), located on Alaska's North Slope near Prudhoe Bay and the Trans-Alaska Pipeline.

In 1980 Congress directed that the 1.5 million acre Coastal Plain of ANWR be made the subject of a special in-depth study of its fish and wildlife resources and of its obvious oil and gas potential by the Department of the Interior. On April 20, 1987, the Department of the Interior released its final report on the hydrocarbon and wildlife resources of the Coastal Plain. The Department's study projects that the Coastal Plain contains "giant" and "super giant" oil and gas fields, having potential reserves which rival, perhaps even exceed, those of Prudhoe Bay, the nation's largest oil discovery ever. The study concludes that the Coastal Plain of ANWR may be the most outstanding oil and gas frontier remaining in the United States, and recommends that the entire 1.5 million acre area be opened for oil and gas leasing, under prudent environmental regulations.

1050 Thomas Jefferson Street, N.W. – Sixth Floor, Washington, D.C. 20007 (202) 333-7484

MEMBERSHIP: Alaska Oil & Gas Association • American Association of Petroleum Landmen • American Petroleum Institute • Americans for a Rational Energy Policy • Arctic Slope Regional Corporation • Association of Oil Pipelines • BP North America • Brown & Root, Inc. • Chevron U.S.A. Inc. • Crowley Maritime • Dresser Industries, Inc. • Highway Users Federation • Independent Petroleum Association of America • International Association of Drilling Contractors • International Association of Geophysical Contractors • Joint Maritime Congress • Marriott Corporation • NAACP - Anchorage Branch • National Association of Home Builders • National Association of Manufacturers • National Marine Engineers Beneficial Association • National Coal Association • National Ocean Industries Association • National Tour Association, Inc. • Petroleum Equipment Suppliers Association • Rocky Mountain Oil and Gas Association • The Standard Oil Company • The National Grange • U.S. Chamber of Commerce • Western Oil and Gas Association

On May 15, 1987, Senators Frank Murkowski and Ted Stevens, introduced S. 1217, a bill proposing to amend the Mineral Leasing Act of 1920, to authorize the Secretary of the Interior to lease, in an expeditious and environmentally sound manner, the public lands within the Coastal Plain of the North Slope of Alaska for oil and gas exploration, development and production.

S. 1217 presents our nation the opportunity to take early, well planned, strategic steps to avoid undue reliance on insecure sources of imported oil. The nation's of the Middle East are major players in international affairs today because of their levels of crude oil production, their huge reserves and their ability to control prices through regulation of supply. If the Coastal Plain of ANWR is opened to development under reasonable and prudent environmental regulations, the United States will benefit from greater domestic production and thus reduce the threat of a repeat of the energy crises of the 1970's. The tragedy presented by the U.S.S. Stark incident in the Persian Gulf underscores the instability of this area of the world as a source of crude oil supplies.

The opportunity of national benefit from greater domestic production and the peril of rising oil imports are not the only issues we feel warrant your attention: (1) Every barrel of Alaskan oil produced contributes a significant reduction in our already enormous balance of payments deficit. In fact, Alaskan oil reduced our balance of payments in 1985 alone by over $17.5 billion. Since oil production on the North Slope began roughly ten years ago, over $120 billion of imports have been replaced by Alaskan oil; (2) The exploration and development of the public lands of the Coastal Plain will mean new jobs and orders for goods and services in virtually every state, with significant economic activity in all regions of the country; (3) a small percentage of the area designated as the Coastal Plain of ANWR is owned by the Inupiat Eskimos through two native corporations (the Kaktovik Inupiat Corporation and the Arctic Slope Regional Corporation). Any oil revenues which might result from these lands represents the last and perhaps the only chance that the North Slope Eskimo will have to benefit directly from Alaskan oil development. Although the Native Alaskans may drill exploration wells, they are prohibited by law from producing any oil from their own lands until Congress acts; (4) No other oil fields in the world have received the same attention with regard to environmental safeguards and monitoring as those currently producing on the North Slope. The record is extensive and demonstrates that the technology and practices exist to locate and produce oil with minimal impact on the surrounding natural environment.

On February 11, 1987, Congressman Don Young, along with 22 co-sponsors, introduced H.R. 1082, a bill proposing that the Secretary of the Interior be authorized to lease lands in the Coastal Plain of ANWR. To date there are 146 co-sponsors on this measure. I have enclosed for your review a state-by-state breakdown of the co-sponsors for Congressman Young's bill.

On behalf of the membership of the Coalition For American Energy Security who care about the security and independence of our nation, please lend us your support. In addition to advancing the nation's vital security interests in maintaining reasonable levels of domestic oil production, your cosponsorship of S. 1217 indicates your support for keeping the Trans-Alaska Pipeline full, and your support for allowing the North Slope Eskimos to produce the oil and gas reserves contained on the 92,000 acres of private lands they own which are located within and adjacent to the Coastal Plain.

The Coalition For American Energy Security supports S. 1217 and other legislative proposals which would lift current prohibition on oil and gas development within ANWR's boundaries to exploration and development. I urge you to carefully consider cosponsoring S. 1217.

I am enclosing a copy of testimony submitted on behalf of the membership of the Coalition For American Energy Security to the Senate Committee on Energy and Natural Resources.

Please call me if I can answer questions you may have.

Sincerely,

Isabelle Tapia

M. Isabelle Tapia
Executive Coordinator

TESTIMONY OF
ISABELLE TAPIA
EXECUTIVE COORDINATOR FOR THE
COALITION FOR AMERICAN ENERGY SECURITY
BEFORE THE
SENATE ENERGY AND NATURAL RESOURCES COMMITTEE

June 4, 1987

My name is Isabelle Tapia. I am the Executive Coordinator of the Coalition For American Energy Security. The Coalition was formed to assist in efforts to open the Coastal Plain of Alaska to oil and gas exploration and development under proper environmental regulation. The Coalition is a broad based national Coalition representing agriculture, labor, energy, maritime, construction and highway user groups. A list of the Coalition's current members is attached to my testimony.

The future of the 1.5 million acre area known as the Coastal Plain of the Arctic National Wildlife Refuge (ANWR) will be decided in the 100th Congress. This issue is one of the most significant energy policy and national security issues of recent decades.

The Coastal Plain of ANWR contains the nation's most highly prospective area for major discoveries of oil and gas. The public lands of the Coastal Plain are located on Alaska's North Slope near Prudhoe Bay and the Trans-Alaska Pipeline.

Very significant oil and gas discoveries have been made both to the east, in Canada, and to the west of the Coastal Plain, at Prudhoe Bay. All knowledgeable observers agree, including an independent geologist in a consultant report made public by the National Wildlife Federation, that this small (by Alaska standards) 1.5 million acre area represents the nation's best prospect for discovery of one or more new "Middle East class" oil reservoirs of Prudhoe Bay dimensions.

The issue before the Congress is whether the Coastal Plain of ANWR will be legislatively opened to exploration, development and production or, on the other hand, be designated as "Wilderness" and, therefore permanently closed. Failure of the Congress to act on pending legislation on this important matter means that the Coastal Plain will continue to be managed as de facto Wilderness.

Many national environmental organizations, of course, strongly advocate "Wilderness" designation for the Coastal Plain. The Coalition opposes such a designation. ANWR already contains 8 million acres of Wilderness.

The nations of the Middle East are major players in international affairs today because of their levels of crude oil production, their huge oil and gas reserves and their ability to control prices. Opening the Coastal Plain of ANWR to development, under reasonable and prudent environmental regulations, will benefit the United States by resulting in greater domestic production.

Oil imports in the United States were up 24% in 1986 over 1985. They are expected to reach 52-68% of total supply by the year 2000, if not sooner. Imports, on an annual basis, are now 35% of total U.S. consumption. Such heavy reliance on oil imports weakens the U.S. economy, exports American jobs, and seriously undermines our national security.

Today Prudhoe Bay and Alaska's North Slope provide more than 20 percent of the nation's total domestic crude oil production. These resources will begin to significantly decline at the rate of 10-12% a year beginning in 1988. In the future, the 1.5 million acre Coastal Plain has the potential, if it is opened, for enabling Alaska's North Slope to continue to provide a major alternative to imported oil and a very substantial contribution to our nation's petroleum needs.

Over 20 years of oil industry experience at Prudhoe Bay conclusively demonstrates that crude oil exploration, development and production can take place in a manner that is compatible with the subsistence uses of the Native people of the North Slope and the important fish and wildlife resources of the Arctic and the Coastal Plain.

The seriousness of the situation the nation faces has been documented in a variety of recent Federal reports and in major articles in national publications. Our nation has been presented with an opportunity to take early, well planned, strategic steps to avoid undue reliance on insecure foreign sources for imported oil; an opportunity "to act" rather than "react" to the needs of the American people.

The first issue which requires the attention of and action by the Congress is to open the Coastal Plain to oil and gas development.

Thank you.

COALITION FOR AMERICAN ENERGY SECURITY
1050 Thomas Jefferson Street, N.W. - Sixth Floor
Washington, D.C. 20007

M. Isabelle Tapia
Executive Coordinator

(202) 333-7484

June 1, 1987

Alaska Oil & Gas Association
American Association of Petroleum Landmen
American Institute of Merchant Shipping
American Mining Congress
American Petroleum Institute
Americans for a Rational Energy Policy
Arctic Slope Regional Corporation
Association of Oil Pipelines
BP North America
Brown and Root, Inc.
Chevron U.S.A. Inc.
Crowley Maritime Corporation
Dresser Industries, Inc.
Highway Users Federation
Independent Petroleum Association of America
International Association of Drilling Contractors
International Association of Geophysical Contractors
Joint Maritime Congress
Marriott Corporation
NAACP - Anchorage Branch
National Association of Home Builders
National Association of Manufacturers
National Marine Engineers Beneficial Association
National Coal Association
National Ocean Industries Association
National Tour Association, Inc.
Petroleum Equipment Suppliers Association
Rocky Mountain Oil and Gas Association
The Standard Oil Company
The National Grange
U.S. Chamber of Commerce
Western Oil and Gas Association

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Highway Users Federation
FOR SAFETY AND MOBILITY

STATEMENT OF THE
HIGHWAY USERS FEDERATION

before the

Committee on Energy and Natural Resources

U. S. Senate

on

Energy Exploration and Development on the Coastal Plain of the Arctic National Wildlife Refuge in Alaska

Presented by

Lester P. Lamm

President

June 4, 1987

1776 Massachusetts Avenue, N.W., Washington, D.C. 20036-1993 (202) 857-1200

I am Lester P. Lamm, President of the Highway Users Federation for Safety and Mobility.

The Federation appreciates this opportunity to go on record in strong support of energy exploration and development on the coastal plain of the Arctic National Wildlife Refuge (ANWR). This support was registered at a public hearing held earlier in the year by the Department of Interior regarding its proposed recommendation to the Congress, by the Federation and its affiliated but independent highway user conferences in a number of states. We welcome the chance to again state our conviction that such effort to augment our domestic energy resources is in the public interest.

The Federation is a national, long standing coalition of businesses, industries, and associations working to make the nation's highway transportation system safer and more efficient. Our 400 plus companies and business associations cut across 27 industrial and commercial categories, and are the chief users of highways and the main providers of highway transportation products and services, with affiliated highway user groups in every state.

Federation members have a vital concern for, and a major stake in, the orderly and continuing development of domestic energy resources. Even though the motoring public currently enjoys adequate supplies of competitively priced motor vehicle fuel, it has not forgotten the spectre of fuel shortages in the 1970's, nor the economic burden endured because of too great a reliance on imported oil just a few years ago. Back then we imported nearly 50 percent of the petroleum consumed.

With oil imports again on the rise this past year, there is serious concern that by the end of this decade, we may be back to the same level of reliance on imports to meet our energy needs.

The nation's economy relies on efficient and dependable highway transportation. Almost all agricultural products and manufactured goods move on highways at some point between production and consumption, and will continue to do so for the foreseeable future.

Highway transportation in turn is almost completely dependent on liquid fuels -- specifically petroleum-based products. Because of this unique dependence, ensuring long-term availability of liquid fuels for highway transportation purposes must be of the highest national priority.

In its draft report to the Congress, the U.S. Department of the Interior indicated that the ANWR coastal plain is clearly the most outstanding oil and gas frontier remaining in the United States, and "could contribute substantially to our domestic energy supplies."

The Federation finds this a particularly compelling reason for supporting the recommendation that ANWR be opened for oil and gas development. The U.S. currently imports about a third of its oil from foreign sources that could be vulnerable to interruptions and embargoes. Increasing domestic energy supplies will help protect the nation's economy from the damage which would be inflicted if its transportation systems were halted for lack of fuel.

We cannot wait for another emergency before we begin the time-consuming process of oil exploration. The ten to fifteen year lead times necessary in arctic petroleum development clearly militate against delay in getting this essential work under way.

In the highway transportation business, we take the long view. We understand the importance of and need for lead time. Highways cannot be built overnight -- the Interstate System of highways was started in 1956, and we will finish it about 1990. Nor will the energy industry be able to respond instantly to another energy crisis, if such should occur. We must take advantage of time when it is available.

Strong support for domestic energy development is not a new issue for highway users. Over the past several years we have supported environmentally sound domestic energy exploration and development on public lands, including the Outer Continental Shelf (OCS), and have opposed legislative and administrative measures which needlessly hampered such efforts. Highway users in every state have gone on record on various energy issues. Several conferences presented their views at other DOI hearings on the ANWR report. Too much is at stake to do otherwise.

In public debate on energy issues such as ANWR development, often overlooked is the fact that the shape of America is changing. The 1980 Census indicates that we are undergoing demographic and economic shifts which will have major long term impacts. Patterns of industrial development and the growth of our rural areas, for example, all point to increased reliance on our highway transportation arteries for the essential movement of people and goods. Hence oil will be a critical factor in this process of change.

Our society is becoming more, not less, motor vehicle dependent. Insuring adequate supplies of essential motor fuel will of necessity continue to be a priority concern.

The concern of highway users can perhaps be summed up in the following facts:

- Between 1970 and 1985, automobile travel increased by 47 percent, and truck traffic more than doubled, for a remarkable 1.8 trillion vehicle miles of travel in the United States in 1985. At an annual projected growth rate of 4.0 percent, Americans will be driving an estimated 3 trillion miles annually by the year 2000, just 13 short years ahead.

- Transportation requires about 27 percent of U. S. energy consumption, industrial consumption is 37 percent, with residential and commercial consumption accounting for the balance.

- Oil meets almost half of the nation's energy needs with the remaining needs principally served by natural gas and coal.

Given the dependence of motor vehicles on liquid fuels and the dependence of the nation on highway transportation for the foreseeable future, the interest of highway users in an aggressive domestic energy development policy is evident.

Given the potential of the coastal plain of ANWR to bolster America's domestic energy resources, it is clearly in the interest of highway users to urge Congress to take appropriate steps that will open that sector of ANWR for energy exploration and development.

Highway users in every state will welcome such Congressional action.

LOUNSBURY & ASSOCIATES, INC.
ENGINEERS PLANNERS SURVEYORS 723 W 6th Avenue, Anchorage, Ak 99501 Tel (907) 272-5451

June 17, 1987

Senate Committee on Energy
and Natural Resources
SD 358 Dirksen Office Bldg.
Washington, DC 20510

Attention: Mr. Tom Williams

Regarding: Arctic National Wildlife Refuge

Dear Mr. Williams:

I am in support of the opening of ANWR to environmentally sensitive oil exploration, development and production.

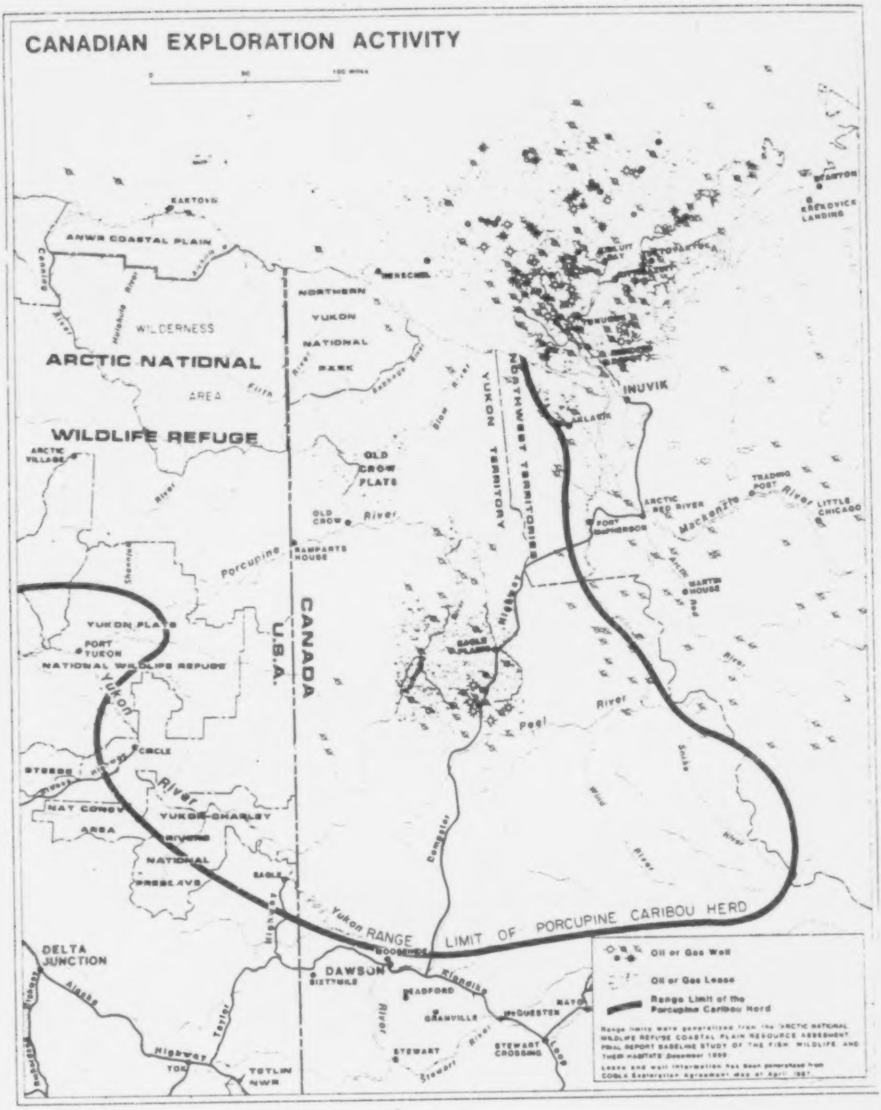
The issues of national security and refuge values need not be mutually exclusive. The attached map indicates the oil wells which have been drilled within the bounds of the Porcupine Caribou herd. As can be seen by this map, over 50 wells have been drilled and an extensive highway (Dempster Highway) has been constructed. All of this has been with little noticable affect upon the migration or calving of the Porcupine Caribou Herd. Recent activities in the Persian Gulf can only graphically display the precarious situation in which the Western economies find themselves. Although ANWR may not be the final solution to our energy independence, it shall go a very long ways in making our nation secure. I urge the Senate Committee on Energy and Natural Resources to carefully weight and consider the testimony presented. I believe they will come to the conclusion, as I have, that ANWR can be opened and the wildlife values not destroyed.

Sincerely,

LOUNSBURY & ASSOCIATES, INC.

Darl W. Kvasager, P.E.
President

DWK/sw



CANADIAN EXPLORATION ACTIVITY

0
50
100 miles
KAKTOVIK
ANWR COASTAL PLAIN
Canning River
Hulahula River
WILDERNESS
ARCTIC NATIONAL
AREA
WILDLIFE REFUGE
ARCTIC VILLAGE
Firth
River
HERSCHEL
NORTHERN
YUKON
NATIONAL
PARK
Babbage River
Blow River
OLD CROW FLATS
OLD CROW
River
Porcupine
RAMPARTS HOUSE
YUKON TERRITORY
NORTHWEST TERRITORIES
TUKTOYAKTUK
INUVIK
AKLAVIK
STANTON
KRERDVICK LANDING
ARCTIC RED RIVER
FORT McPHERSON
TRADING POST
Mackenzie River
LITTLE CHICAGO
MARTIN HOUSE
Arctic Red River
Peel River
Snake River
Wind River
EAGLE PLAINS
Highway
Dempster
Sheenjek
YUKON FLATS
FORT YUKON
NATIONAL WILDLIFE REFUGE
CANADA
U.S.A.
Yukon
CIRCLE
STEESE
Highway
River
YUKON-CHARLEY
NAT CONSV AREA
RIVERS
NATIONAL
PRESERVE
EAGLE
Highway
Yukon
RANGE LIMIT OF PORCUPINE CARIBOU HERD
DELTA JUNCTION
Alaska
Highway
Taylor
TOK
TETLIN NWR
DAWSON
SIXTYMILE
RADFORD
GRANVILLE
Klondike
River
STEWART
Stewart River
STEWART CROSSING
MAYO
McQUESTEN
Loop
Oil or Gas Well
Oil or Gas Lease
Range Limit of the Porcupine Caribou Herd

Range limits were generalized from the 'ARCTIC NATIONAL WILDLIFE REFUGE COASTAL PLAIN RESOURCE ASSESSMENT FINAL REPORT BASELINE STUDY OF THE FISH, WILDLIFE AND THEIR HABITATS December 1986

Lease and well information has been generalized from COGLA Exploration Agreement Map of April 1987

STATEMENT OF THE
NATIONAL ASSOCIATION OF HOME BUILDERS
BEFORE THE
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
ON OIL AND GAS EXPLORATION IN THE ANWR COASTAL PLAIN

JUNE 12, 1987

The National Association of Home Builders (NAHB), a trade association representing more than 147,000 members, is pleased to have this opportunity to submit a statement to the Senate Committee on Energy and Natural Resources. NAHB would like to go on record in support of the proposed leasing of the coastal plain of the Arctic National Wildlife Refuge (ANWR) for oil and gas exploration.

During the January NAHB convention, the Alaska State Home Builders Association submitted a resolution to urge the Administration and Congress to open the ANWR coastal plain to environmentally responsible oil and gas exploration, development and production. This resolution was approved by the NAHB Board of Directors.

Accordingly, NAHB would like to go on record in support of S.1217, legislation sponsored by Alaska Senators Frank Murkowski and Ted Stevens. S.1217 is consistent with official NAHB policy as it calls for leasing the ANWR coastal plain in an environmentally responsible and expeditious manner. Similar legislation, H.R.1082, has been introduced in the House of Representatives by Congressman Don Young.

Domestic oil production plays a vital role in the overall health and financial well-being of not only Alaska but the "lower 48 states." As production in the Prudhoe Bay field declines in the next two to three years, it will become increasingly important to ensure an uninterrupted domestic supply of oil. The ANWR coastal plain holds the greatest promise to supply the domestic reserves necessary to avoid increased dependence on foreign oil imports.

In addition, the Alaskan housing industry and economy is very dependent on the oil industry. Three out of ten jobs in Alaska are directly related to the oil industry. Housing production in 1983 reached a high of 12,000. That dropped to 6,000 the next year, 2,500 in 1985, and 700 in 1986. That decline has had a severe impact on the entire Alaskan economy.

Not only will builders in Alaska be affected by a lack of domestic oil production, but homebuilders throughout the nation have expressed their concern. During discussion on the ANWR resolution, two key concerns emerged.

First, numerous building products are manufactured from petroleum -- PVC pipe, asphalt roofing shingles, and asphalt used to pave streets and sidewalks. These materials represent essential housing materials and shortages or higher prices caused by a lack of petroleum will only serve to drive up the cost of housing.

As important was the concern over a recurrence of the 1973 Arab oil embargo. Many of our members experienced considerable delays and additional expenses caused by a lack of fuel for their equipment. Members not living in metropolitan areas found it necessary to have fuel privately supplied at additional expense.

NAHB believes that careful and orderly development of northeastern Alaska's coastal plain is in our nation's economic and energy security interests. Only 1.5 million acres of the entire ANWR area of 17.9 million acres is proposed to be opened for leasing. The rest of the ANWR, approximately 92 percent, will remain reserved exclusively for wildlife habitat.

Thank you for considering our views on this important issue. A copy of the resolution as passed by the NAHB Board of Directors has been attached to this statement.

NAM

National Association of Manufacturers

H. RICHARD SEIBERT Jr.
Vice President
Resources and Technology Department

June 24, 1987

The Honorable J. Bennett Johnston
United States Senate
Washington, DC 20510

Dear Senator Johnston:

The National Association of Manufacturers (NAM) urges you to support S. 1217, the proposed "Arctic Coastal Plain Public Lands Leasing Act of 1987," introduced on May 15 by Senator Murkowski. This proposal would "authorize the Secretary of the Interior to lease, in an expeditious and environmentally sound manner, the public lands within the Coastal Plain of the North Slope of Alaska for oil and gas exploration, development and production."

NAM's interest in the Coastal Plain stems from the fact that our association's membership constitutes major users of energy as well as most of the domestic producers. Despite the diversity of interests, however, NAM members are all concerned with international competitiveness, the effect of oil imports on the balance of trade, environmental protection, national energy security, and, of course, the health of our domestic economy, vis-a-vis its reliance on foreign sources for increasingly more of its oil needs.

An adequate and secure supply of energy at competitive prices is necessary for the nation's economic growth. However, recent trends in the oil and gas sector reflect a rising U.S. dependence on imported oil. U.S. petroleum imports were approximately 6 million barrels a day in 1986--the highest level since 1980. If this trend continues, imports could make up nearly 50-60 percent of U.S. needs by 1995.

Such heavy reliance on oil imports could further weaken the U.S. economy, which is why it is imperative that this nation prepare for the future and take action to explore and develop domestic resources, including the Coastal Plain of the Arctic National Wildlife Refuge (ANWR). In addition, it is also important to note that exploration and development can co-exist with wildlife and strict environmental considerations. One need only look to Prudhoe Bay to see that energy resources can be developed in an environmentally safe and responsible manner.

The decisions we make today on ANWR will help to determine how vulnerable we are to imported oil in the near future. NAM, therefore, urges your support of S. 1217, which would give the United States the opportunity to explore for resources that we urgently need. Thank you for considering NAM's viewpoint.

Sincerely,

Rich Seibert

1331 Pennsylvania Ave., NW
Suite 1500 - North Lobby
Washington, DC 20004-1703
(202)637-3000

National Association of Manufacturers

H. RICHARD SEIBERT, Jr
Vice President
Resources and Technology Department

June 24, 1987

Mr. J. Bennett Johnson
Chairman
Senate Energy and Natural
 Resources Committee
364 Dirksen Senate Office Building
Washington, DC 20510

Dear Mr. Chairman:

The National Association of Manufacturers (NAM) respectfully submits the enclosed statement to be included in the official record for hearings held June 11 and 12 on oil and gas leasing in the Arctic National Wildlife Refuge in Alaska.

Thank you for consideration of our views.

Sincerely,

1331 Pennsylvania Ave., NW
Suite 1500 - North Lobby
Washington, DC 20004-1703
(202)637-3000

MANUFACTURING CREATES AMERICA'S STRENGTH

Statement
of

The National Association of Manufacturers

ON PROPOSED
OIL AND GAS LEASING IN THE
ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

Before the Energy and
Natural Resources Committee
United States Senate

June 23, 1987

National Association of Manufacturers
1331 Pennsylvania Avenue, NW, Suite 1500 — North Lobby
Washington, DC 20004-1703 (202) 637-3000

The National Association of Manufacturers is a voluntary business association of more than 13,500 corporations, large and small, located in every state. Members range in size from the very large to the more than 9,000 smaller manufacturing firms, each with fewer than 500 employees. NAM member companies employ 85 percent of all workers in manufacturing and produce more than 80 percent of the nation's manufactured goods. NAM is affiliated with an additional 158,000 businesses through its Associations Council and the National Industrial Council.

Executive Summary

NAM supports action to open up the Coastal Plain of the Arctic National Wildlife Refuge (ANWR). Our interest in the Coastal Plain stems from the fact that our nation needs an adequate and secure supply of energy at competitive prices to sustain economic growth. Unfortunatly, recent trends in the oil and gas sector reflect a rising U.S. dependence on imported oil. U.S. pertroleum imports were approximately 6 million barrels a day in 1986--the highest level since 1980. If this trend continues, imports could make up nearly 50-60 percent of U.S. needs by 1995.

Such heavy reliance on oil imports could further weaken the U.S. economy, which is why it is imperative that this nation prepare for the future and take action to explore and develop domestic resources including the Coastal Plain of ANWR. In addition, it is also important to note that exploration and development can co-exist with wildlife and strict environmental considerations. One need only look next door to Prudhoe Bay to see that energy resources can be developed in an environmentally safe and responsible manner.

The decisions we make today on ANWR will help to determine how vulnerable we are to imported oil in the near future. NAM, therefore, ugres you to support legislation, which would give the United States the opportunity to explore for resources that we urgently need.

Statement
of

The National Association of Manufacturers

ON PROPOSED OIL AND GAS LEASING IN THE ARCTIC NATIONAL WILDLIFE REFUGE. ALASKA

Before the Energy and
Natural Resources Committee
United States Senate

June 23. 1987

This statement is submitted on behalf of the National Association of Manufacturers (NAM) in response to the committee's hearings on Alaska's Arctic National Wildlife Refuge (ANWR). NAM supports legislative action that would open up the Coastal Plain of the Arctic National Wildlife for oil and gas exploration, development and production.

NAM's interest in ANWR stems from the fact that our association's membership constitutes major users of energy as well as most of the domestic producers. Despite the diversity of NAM membership interests. however. it is safe to say that they're all concerned with international competitiveness. the balance of trade. the federal deficit. national security. and. of course. the health of our domestic economy.

FOREIGN OIL IS DISPLACING U.S. OIL IN THE U.S. MARKET

Today. America's energy producers are rapidly losing ground to imports in the oil marketplace. National energy forecasters now predict that oil imports may increase from 35 percent of the U.S. market to 50-60 percent by the mid 1990s. Furthermore. U.S.

imports from the volatile Persian Gulf area have increased 300 percent in 1986 and accounted for more than half of the total increase in imports last year.

But, even with immediate access to high potential areas such as ANWR, this picture will not improve short-term. Exploration and development of Arctic oil and gas usually takes more than ten years from the initial discovery to first production. Consequently, any production from this area is not likely to occur much before the end of this century. At that time, oil production from current U.S. reserves is expected to have declined considerably from the present level of over 8 million barrels per day (bpd) to less than 3 million bpd, and Prudhoe Bay production, which in 1986 is averaging 1.5 million bpd, will have declined (according to the State of Alaska, Department of Revenue) to 280,000 bpd in the year 2000. To compensate for this loss of production, new discoveries of domestic oil must be developed or imports must be increased. There are few alternatives.

But despite its relative inaccessibility, ANWR is actually a valuable potential source of domestic oil, in part due to the in-place infrastructure resulting from Prudhoe Bay development.

TRANS-ALASKA PIPELINE ENHANCES COMPETITIVENESS OF THE ANWR RESOURCES

It should be remembered when considering development of ANWR that the Trans-Alaska Pipeline System (TAPS), which was completed in 1977 and cost approximately 10 billion dollars, is already in place. The close proximity of TAPS to the ANWR region only enhances the resource potential for this area and other economic reasons make ANWR attractive.

The approximate $10 billion cost to place TAPS in operation represents a sunk cost: if capacity is fully used, the marginal cost of utilizing TAPS is independent of this cost and is quite low.

Since the cost of producing petroleum resources at any site includes development and transportation, the availability of TAPS capacity to transport potential North Slope production at ANWR and elsewhere represents a significant cost advantage versus a site where a more expensive transportation option is required.

This cost advantage resulting from the availability of relatively inexpensive TAPS capacity means that fewer resources need to be expended to produce the petroleum resources in ANWR than at a comparable site lacking in-place transportation facilities.

Consequently, the availability of throughput capacity at TAPS for potential ANWR production is not only valuable in that it will help keep out foreign imports, but it will also be economically competitive.

ENVIRONMENTAL CONCERNS

"Economically competitive" however does not exclude "environmentally compatible" development. Opposition to petroleum operations on the ANWR plain arises from the concern that wildlife species and habitat will be significantly harmed. Although any sizeable petroleum operation will have some impact upon the environment, previous experience demonstrates that ANWR resources can be used in a safe and responsible manner.

One need only look "next door" to the Prudhoe Bay operations. It has been proven that industry and environment can coexist in a multiple use land management program.

In fact, several major problems have been resolved as a result of the Prudhoe Bay operation. Aside from the hostile climate and difficult logistics of operating in an extremely remote location, the most challenging technical problems encountered and solved in the onshore Arctic were related to permafrost.

From the years of operating experience there has been developed an environmental protection technology to minimize, and in some cases eliminate, long term changes in the tundra. For example, low-pressure tired vehicles have been developed which can cross the tundra without crushing the vegetative mat or scouring the soils as tracked vehicles might.

The issue of the caribou is of course a concern. Again, Prudhoe Bay serves as an example. When the Prudhoe Bay oil field was developed in the mid-1970s, regulatory agencies acted cautiously and studies were conducted to determine the effects on the Central Arctic caribou herd. In fact, the results of the studies and the tools implemented to prevent damage to the Central Arctic herd were quite positive, in that the herd has increased at a rate of 12-18 percent per year over the past decade. At more than 13,000, it numbers at least four times what it did in 1975 before most of the Prudhoe Bay development activity began. The positive results from Prudhoe Bay and other similar experiences from northern

Europe and the Soviet Union, prove that herds can exist in the presence of industrial development, including oil fields and railroads. Wildlife habitats, environmental values, and the petroleum industry can and do coexist.

CONCLUSION

As important as ANWR is, it's only one piece of the major energy puzzle. ANWR is what could rescue this nation from foreign imports and provide for some energy needs well into the 21st century. We must be able to plan for future needs, and ANWR can play a role in meeting these needs, in the context of comprehensive energy planning.

NAM supports the recent proposal, S. 1217 offered by Senator Murkowski which would "authorize the Secretary of the Interior to lease, in an expeditious and environmentally sound manner, the public lands within the Coastal Plain of the North Slope of Alaska for oil and gas exploration, development and production."

In addition, NAM supports Rep. Young's bill H.R. 1082, which also proposes to authorize oil and gas leasing and exploration in the Coastal Plain of ANWR.

NAM's long-standing policy has been that public land should not be closed to or restricted from resource development and nonwilderness multiple uses in the absence of compelling national interests that override the need for adequate domestic oil, natural gas and other valuable resources. Before areas are set aside for exclusive uses, every effort should be made to determine the availability of materials and other resources on the proposed set asides, and access should be assured to explore and develop the area's resources.

United States' energy policy should be oriented towards significantly reducing our nation's dependence on imported energy resources. The development of domestic energy resources, such as those contained in ANWR, are the best hope to reduce America's energy vulnerability, and enhance the ability of U.S. manufacturers to be more competitive in world markets. We must take action against economic influences brought on by unstable energy markets that don't allow for proper planning of manufacturers' energy needs and the producers' opportunity to explore. Thank you for the opportunity to express our views.

national grange

1616 H STREET, N.W. WASHINGTON, D.C. 20006 (202) 628-3507

June 5, 1987

The Honorable J. Bennett Johnston, Chairman
The Honorable James A. McClure, Ranking Minority Member
Senate Committee on Energy and Natural Resources
310 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Senators Johnston and McClure:

On June 2, the Committee on Energy and Natural Resources began holding hearings on the Department of the Interior's proposal to open 1.5 million acres of the Coastal Plain area of the Arctic National Wildlife Reserve (ANWR) in Alaska to oil and natural gas exploration and development. On behalf of our organization's 365,000 members, I would like to express to the Committee our support for the Department of the Interior's ANWR proposal.

The Coastal Plain area of ANWR, which is located near the famous Prudhoe Bay oil fields of northern Alaska, is considered to be the best prospect for finding large amounts of oil on land remaining in the United States. Valuable experience that has been obtained during the exploration and development of the Prudhoe Bay fields has given the U.S. oil industry the technical know how to find and extract petroleum resources in the sensitive environments north of the Arctic Circle without resulting in irreversible ecological damage. Transporting oil from the ANWR Coastal Plain would be economically feasible because of the existence of the TransAlaska pipeline.

National Grange policy supports the reasonable development of this nation's petroleum resources in an environmentally-sound manner. Rural Americans, in general, understand both the benefits and risks inherent in the exploration and development for oil. Energy costs are a large part of both the cost of production on our farms and the cost of living in rural areas. Energy development is a major employer in rural areas, but those same areas have a disproportionate burden of the environmental risks of such development. We understand the concern by some that oil development will damage fragile arctic ecosystems or degrade local economic resources, such as hunting areas for Alaskan native hunters, but after examining the available data on all sides of the issue, we believe that developing the ANWR Coastal Plain will protect our national energy security, our jobs and our environment.

We appreciate this opportunity to express our views on this issue. Please be advised that National Grange policy on ANWR Coastal Plain development is also supported by local Grange policy in Alaska. We would appreciate this letter being made a part of the permanent hearing record.

Sincerely,

Leroy Watson

Leroy Watson
Legislative Representative

LAW/pkh
cc: Senate Committee on Energy and Natural Resources

National Wildlife Refuge Association

16096 Creekwood Road
Prior Lake, Minnesota 55372
(612) 447-5586

President
Forrest A. Carpenter
16096 Creekwood Road
Prior Lake, MN 55372
(612) 447-5586

Vice President
Donald V. Gray

Treasurer
Dorothy L. Gray
P.O. Box 124
Winona, MN 55987
(507) 454-5940

Secretary
Lester H. Dundas
4657 Deerwood Drive
Hopkins, MN 55343
(612) 935-7138

Regional Representatives

Washington, D.C.
Marcus C. Nelson
4216 Downing Street
Annandale, VA 22003
(703) 256-3566

Alaska
Richard J. Hensel
Box 1795W, SRA
Anchorage, AK 99502
(907) 344-1752

Pacific
John B. Van den Akker
18345 S.E. Young's Lane
Boring, OR 97009
(503) 658-2777

Southwest
Lawrence S. Smith
1525 Cedar Ridge N.E.
Albuquerque, NM 87112
(505) 293-0454

North Central
Lester H. Dundas
4657 Deerwood Drive
Hopkins, MN 55343
(612) 935-7138

Southeast
Hans Neuhauser
711 Sandtown Road
Savannah, GA 31405
(912) 897-6462

Northeast
Richard E. Griffith
Washington Drive
Washington, NH 03280
(603) 495-3174

Denver
Frank R. Martin
Route 1, Box 1594
Lewistown, MT 59457
(406) 538-3218

Representative At Large
Charles A. Hughlett
61500 Lobo Road
Montrose, CO 81401
(303) 249-8717

Dedicated to the preservation and perpetuation of the National Wildlife Refuge System.

07-12-87

Honorable J. Bennett Johnston
136 Senate Hart Office Bldg.
Washington, DC 20510-1801

Dear Senator Johnston:

I am Marcus C. Nelson. I represent the National Wildlife Refuge Association which is a non-profit organization, with nationwide membership, and is dedicated to the furtherance of the National Wildlife Refuge System. I participated with members of several other conservation organizations recently in the preparation of a paper entitled, "Accommodating Fish and Wildlife Needs From Potential Energy Resource Development on The Arctic National Wildlife Refuge -An Opportunity-".

I understand we authors of this paper and other people have been invited to testify regarding Senate Bill S735, " A Bill to amend the Land and Water Conservation Fund Act of 1965 and for Other Purposes".

I wish to submit the following comments for the National Wildlife Refuge Association (NWRA), to be included in the hearing record.

As has been stated by many who have testified at previous hearings, the Arctic National Wildlife Refuge (ANWR) is certainly one of the most unique, outstanding and significant units of The National Wildlife Refuge System of the United States, the worlds most advanced system of it's kind.

The NWRA does not agree with development as proposed by the Secretary of The Interior. However, if The Congress determines that exploration and development of the oil and gas resources that may exist on ANWR is necessary to the nation's economic security, all possible steps must be taken to insure a careful, well planned and reasonable approach to exploration and development. We believe that initial exploratory drilling should be limited to the most promising sites to prove up on geological predictions. Development might then be undertaken on those sites that show evidence of Economically feasible quantities of oil or gas, and in such a manner as to minimize to the fullest extent possible the adverse impacts on all refuge resources, giving special attention to the protection of the highly important caribou calving grounds.

Should exploration prove positive with respect to the practical development of one or more sites for oil and gas, and it is determined to be in the best national interest, then it is our belief that the entire amount of the Federal share of revenues from ANWR lease fees, bonuses, royalties and other forms of income should be dedicated to benefit the National Wildlife Refuge System. In particular

National Wildlife Refuge Association

16096 Creekwood Road
Prior Lake, Minnesota 55372
(612) 447-5586

President
Forrest A. Carpenter
16096 Creekwood Road
Prior Lake, MN 55372
(612) 447-5586

Vice President
Donald V. Gray

Treasurer
~~Dorothy L. Gray~~
P.O. Box 124
Winona, MN 55987
(507) 454-5940

Secretary
Lester H. Dundas
4657 Deerwood Drive
Hopkins, MN 55343
(612) 935-7138

Regional Representatives

Washington, D.C.
Marcus C. Nelson
4216 Downing Street
Annandale, VA 22003
(703) 256-3566

Alaska
Richard J. Hensel
Box 1765W, SRA
Anchorage, AK 99502
(907) 344-1752

Pacific
John B. Van den Akker
18345 S.E. Young's Lane
Boring, OR 97009
(503) 658-2777

Southwest
~~Lawrence S. Smith~~
1525 Cedar Ridge N.E.
Albuquerque, NM 87112
(505) 293-0454

North Central
Lester H. Dundas
4657 Deerwood Drive
Hopkins, MN 55343
(612) 935-7138

Southeast
Hans Neuhauser
711 Sandtown Road
Savannah, GA 31405
(912) 897-6462

Northeast
~~Richard E. Gorman~~
Washington Drive
Washington, NH 03280
(603) 495-3174

Denver
Frank R. Martin
Route 1, Box 1594
Lewistown, MT 59457
(406) 538-3218

Representative At Large
Charles A. Hughlett
61500 Lobo Road
Montrose, CO 81401
(303) 249-8717

Dedicated to the preservation and perpetuation of the National Wildlife Refuge System.

we feel the Federal royalties should be used to fully fund the Refuge Revenue Sharing Act, for continued refuge acquisition and additional moneys made available for various forms of refuge enhancement.

Any portion that goes to the state should be no more than 50 percent, and part of that should be earmarked for the boroughs and villages.

We do not favor the formula expressed in S735 for the distribution of revenues, and particularly the allocation of funds derived from ANWR to other federal agencies. With funds funneled in to refuge reciepts, there would be ample to meet payments to counties in lieu of taxes, boost the acquisition program and finally have money to bring the Refuge System up to its proper state of maintenance standards so badly needed. It could provide the woefully lacking numbers of people to meet expanding public demands in facilities and control. Such a source of funding would enable the Service to retard their constantly eroding ability to adequatly maintain the 420 units and 90 million acre refuge system.

With respect to the establishment of a stable fund for acquisition and recreational purposes, for federal and state agencies, we highly recommend this feature of S735. However, we feel it should be several times the 160 million indicated and should be derived from the ample backlogged funds in the Land and Water Cons. Fund which was established for such purposes. The states in particular have been suffering badly due to lack of appropriations in recent years. The several billion dollars built up in the fund and unused for the purposes intended should be broken loose and used as a permanent, earmarked and stable trust fund as your bill proposes, but not from ANWR revenues.

In summary, we believe it is time now to consider the real problems in detail. What must be done to protect the Fish and Wildlife resources on ANWR in event of development, and conversely, how development can be designed to minimize adverse effects on the total ecosystem, the land, water, gravel, shorelines and vegetative resources on which fish and wildlife depend.

We commend you for reaching out with S735 and opening up the subject to direct consideration of alternatives. It focuses attention on the necessity of thinking in specific terms about what must be done in management to maintain and protect, to the best of our abilities, the natural resources of the refuge, if development ensues.

The National Wildlife Refuge Association appreciates the opportunity to express our views on S735.

Sincerely

Marcus C. Nelson

Marcus C. Nelson - Wash. Representative
National Wildlife Refuge Association
4216 Downing St. Annandale, Va. 22003

The New England Council, Inc.
Headquarters • 120 Boylston Street • Boston, Massachusetts 02116 • (617) 542-2580
Suite 1000 • 1455 Pennsylvania Avenue, N.W. • Washington, D.C. 20004 • (202) 639-8955

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President & Chief Executive Officer
New England Council, Inc.
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Chairman & Chief Executive Officer
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Executive Vice President
Fleet Financial Group
RITA A. O'BRIEN
Vice President
New England Telephone
WILLIAM O'HARA
President
Bryant College
VINCENT M. O'REILLY
Regional Managing Partner Northeast
Coopers & Lybrand
CHARLES A. OREM
President & Chief Executive Officer
Bird-Johnson Company
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Vice President & Regional Manager
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Vice President
United Technologies Corporation
PAUL G. WALLACH
Counsel
Hale and Dorr
ROGER A. YOUNG
President & Chief Executive Officer
Bay State Gas Company

June 19, 1987

The Honorable J. Bennett Johnston
Chairman
Committee on Energy & Natural Resources
SD-364 Dirksen Senate Office Building
Washington D.C. 20510

Dear Senator Johnston:

The New England Council is this region's major business association, representing firms from all sectors of the six-state economy. The Council's mission is to work to improve the economic well-being of the region. With this broad economic development focus, nothing concerns us more than the availability and reliability of energy to support New England's economy.

In the 1970's no part of the country was hurt as badly as New England by our too heavy reliance on imported oil. At the time of the oil crisis some three-quarters of our electricity was generated in (imported) oil-fired plants.

The current surplus of gas and oil in the U.S. is probably a temporary phenomenon, and most analysts predict the "glut" will be used up in three to five years. Energy shortages or dramatically higher prices would thwart the growth of our economy and undermine our prosperity.

The rapid decline in oil prices in the first half of 1986 substantially increased the consumption of oil here in New England and increased imports of oil nationally. This volatile situation illustrates that it is imperative that the U.S. expand its oil and gas production at home. Overreliance on foreign sources of energy is clearly not in our national interest. Therefore, allowing oil exploration and production in the Arctic National Wildlife Refuge should be a matter of national policy.

The U.S.G.S. estimates the ANWR may contain 17 billion barrels of oil and 34 trillion cubic feet of natural gas, both considerably more than Prudhoe Bay. But since it may take more than 15 years to explore and develop this region, we should begin this process without further delay.

In New England, with no indigenous energy resources of our own, we realize the importance of sources of energy we can count on. In a prospering economy, our energy needs are rising at a rate 80% faster than the national average. We have learned from the past how much volatile oil markets and reliance on OPEC countries can hurt New England and the nation.

Of course, the exploration would be carried out in the Arctic under strict regulatory safeguards. The Alaskan pipeline and Prudhoe Bay projects have not harmed the Alaskan plain, and development of the Arctic Refuge would be held to high standards.

There is environmental opposition to the development of every single source of energy for this region. The development of U.S. oil and gas supplies must be a high national priority to help avoid the severe economic dislocation we experienced in the 1970's.

Therefore, The New England Council urges:

1. That the Congress should approve the Department of the Interior's Five-Year Offshore Outer Continental Shelf Oil and Gas Leasing Program

2. That the Congress should permit environmentally sound energy exploration and development of the Arctic National Wildlife Refuge.

Sincerely,

Gale D Merseth

Gale D. Merseth
President

GDM/jl

PESA
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

June 15, 1987

Hon. J. Bennett Johnston
Chairman
Committee on Energy & Natural Resources
136 Hart Senate Office Building
Washington, D.C. 20510

Dear Mr. Chairman:

Attached is the statement reflecting the views of the Association of Oilwell Servicing Contractors, the International Association of Drilling Contractors, the International Association of Geophysical Contractors, the National Ocean Industries Association, the Offshore Marine Service Association and the Petroleum Equipment Suppliers Association in support of the U.S. Department of Interior's plan to open the Arctic National Wildlife Refuge (ANWR) to oil and gas leasing.

On behalf of these associations, I respectfully request that this statement be included in the record on the ANWR issue for the hearings which began June 2, 1987.

Sincerely,

ST DeLaMater

Stephen T. DeLaMater
Chairman
Public Affairs Committee

SDLM:bw
Attachment

9225 KATY FREEWAY HOUSTON, TEXAS 77024 (713) 932-0168

PESA
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

Statement of

The Association of Oilwell Servicing Contractors

The International Association of Drilling Contractors

The International Association of Geophysical Contractors

The National Ocean Industries Association

The Offshore Marine Service Association

The Petroleum Equipment Suppliers Association

Before the

Energy Committee

U.S. Senate

June 12, 1987

9225 KATY FREEWAY HOUSTON, TEXAS 77024 (713) 932-0168

This statement is submitted on behalf of the Association of Oilwell Servicing Contractors, the International Association of Drilling Contractors, the International Association of Geophysical Contractors, the National Ocean Industries Association, the Offshore Marine Service Association, and the Petroleum Equipment Suppliers Association. Together, these associations represent some 250,000 employees and 2,300 firms ranging from the Fortune 500 companies to small individual entrepreneur throughout the country. Attached to this statement is a description of each of these associations.

Each of these associations supports the U.S. Department of the Interior's (DOI) proposed recommendation to Congress that the Arctic National Wildlife Refuge (ANWR) coastal plain should be opened to oil and gas leasing.

At a time of continuing political turmoil and terrorism in the Middle East, it is essential that the United States assign the highest priority to finding and developing additional oil and gas resources within its borders.

DOI's report estimates that there are billions of barrels of oil to be found under the ANWR coastal plain. DOI estimates that recoverable reserves range from 600 million to 9.2 billion barrels of oil, while in-place resources range from 4.8 billion to 29.4 billion barrels. The report states that, "The area is clearly the most outstanding oil and gas frontier remaining in the United States and could contribute substantially to our domestic energy supplies."

Although there is uncertainty inherent in all oil and gas exploration methods which do not include actual drilling, the Interior Department estimates for the ANWR coastal plain a very large crude oil potential -- on the same order of magnitude as the nearby Prudhoe Bay field, the largest U.S. discovery to date.

Crude oil from the North Slope's three producing oil fields -- Prudhoe Bay, Kuparuk, Lisburne, and Milne Point (which may soon be joined by oil from the Endicott field) -- are already contributing about 20 percent to U.S. oil production. The nation's dependency on foreign oil could increase markedly in the years ahead, as these fields -- along with older fields in the lower 48 states -- reach peak production and start to decline -- as many already have. The U.S. must turn to Alaska's undiscovered oil and gas if our future energy supply is to be kept secure.

If we therefore accept the fact that these resources will eventually be needed, the ANWR coastal plain development is particularly urgent at this time as an element to help stabilize economic conditions in the severely depressed U.S. petroleum industry and the many drilling, service, equipment, and supply companies that support it. It is difficult to exaggerate the extent of the current depression in the petroleum industry and the oil producing states. Hundreds of thousands of workers have lost their jobs. Hundreds of drilling and service, equipment, and supply companies have either merged or gone bankrupt as the oil companies have been forced to drastically reduce their spending on exploration and production projects.

Some key statistics highlight the serious depression that has plagued the oilfield industry:

* According to Baker-Hughes Inc., in Houston, Texas, the 1981 U.S. average number of rotary drilling rigs running was 3,969. The 1986 number was 964. The rig count the week of June 8, 1987 was 757.

* Well completions for 1981 were 89,234 according to the American Petroleum Institute. In 1986, the number had fallen to 37,430. Through May, 1987, there were 8,120 completions.

* In 1981, according to the International Association for Geophysical Contractors, an average of 681 seismic crews were active during the year. In 1986, that number had shrunk to 197. The crew count for April, 1987 was 164.

Current U.S. energy supply trends underscore the urgent need to find and produce the potentially vast oil and gas resources of the ANWR coastal plain. Oil prices during 1986 dropped by about 50%. As a result, U.S. consumption has risen and domestic production has fallen. These trends have been accelerating. Consumption was up 1.2% in the first quarter of 1986 over the first quarter of 1985, 2.4% in the second quarter and 3.8% in the third quarter. Production was barely down in the first quarter, 1986, but fell 2.9% in the second quarter and 3.1% in the third quarter. For the year, production was off 3.4%. In the first quarter, 1987 production declined by 7.8% compared to first quarter, 1986.

This growing gap between domestic consumption and production has been filled by an increase in oil imports, which were up 23% in 1986 over the 1985 level. Oil imports for the first quarter, 1987 were up 27.4% over the same period in 1986. Recent import estimates run as high as 40% of U.S. oil comsumption -- a higher level of dependence than at the time of the 1973-74 oil embargo. Furthermore, U.S. imports from the volatile Persian Gulf area have increased 300% in 1986 and accounted for more than half of the total increase in imports in 1986.

Worldwide trends suggest that within the next three to five years the current oil glut will end, leaving the U.S. even more dependent than in the 1970's on imports -- which might then be rapidly rising in price and which would come from unstable and possibly hostile sources. Such heavy reliance on oil imports weakens the U.S. economy, undermines national security and worsens the trade deficit.

We believe our nation cannot afford to exclude the ANWR coastal plain from efforts to find and develop the domestic energy resources so urgently needed to meet our future needs. The alternative is continued and growing dependence on oil imports and increased risk of energy supply disruptions of the type experienced in the 1970's.

We are aware that some environmental groups have expressed concern as to the impact of oil and gas operations on the sensitive ecology of the ANWR coastal plain. Federal law prohibits oil and gas development unless activities are designed to protect the surrounding environment. Experience in Alaska and the lower 48 states shows that current state of the art technology is consistent with National Wildlife Refuge goals. Nearly 20 years of experience on the North Slope demonstrates that oil and gas exploration and development can exist in harmony with the environment. Techniques to minimize disturbances include directional drilling, smaller and consolidated facilities, winter construction, use of temporary ice roads, use of special arctic equipment, and elevated pipelines and facilities.

Oil from the coastal plain would be transported by onshore pipeline to the Trans-Alaska pipeline (TAPS). Experience from TAPS and the Prudhoe Bay, Milne Point and Kuparuk oil field developments proves that pipelines can be designed, constructed and operated on the North Slope to allow passage of caribou and other wildlife.

Exploration activities would also be supported by temporary ice roads, barges and ice airstrips. During development and production, more permanent gravel pads, roads and airstrips would be used to support year-round activities. One main road along a pipeline into ANWR would be needed for pipeline service and re-supply. Roads and facilities would be placed in the most efficient manner possible and concurrence would be required from the U.S. Fish and Wildlife

Service as well as Alaska Department of Fish and Game.

As for potential air quality impacts, the experience at Prudhoe Bay manifests that such impacts are de minimus. In fact, it might be reasonably assumed that air quality would be improved over the Prudhoe experience with the development of much improved emission control technology in the last 20 years.

ANWR is not a local issue. We believe that development of the ANWR coastal plain could result in significant economic benefits to all Americans. Revenue and activity generated by the increased exploration and development activity on the coastal plain would benefit not only the federal and Alaskan state governments, but the economy throughout the U.S., as equipment purchases are made and employment opportunities created, just as other operations in northern Alaska have done.

Between 1980 and 1986, the major oil companies operating on the North Slope spend more than $10.5 billion in the U.S. developing those oil fields. Every state in the Union participated in supplying goods or services, with the shares of business ranging from nearly $1.4 billion in Alaska to some $290,000 in West Virginia. Similar benefits would result from ANWR coastal plain development.

We believe America's energy security is at stake in the ANWR debate. If we are to reduce our heavy dependence on oil imports and provide our nation with a stable and dependable energy future, we must take steps now to increase domestic oil and gas production. We support DOI's draft report recommendation that the ANWR coastal plain be opened to oil and gas leasing.

ASSOCIATION OF OILWELL SERVICING CONTRACTORS

The Association of Oilwell Servicing Contractors is the service organization to the oil industry. It's job is to service and maintain production from the nation's source of 850,000 oil and gas wells. The AOSC is composed of some 700 member companies across the U.S. which represent about 4,000 well service rigs and associated suppliers and manufacturers to the industry.

INTERNATIONAL ASSOCIATION OF DRILLING CONTRACTORS

Founded in 1941, IADC currently has 1,366 member companies, including oil and gas well drilling contractors, service/supply/manufacturing firms, and producing oil and gas companies.

Membership is virtually world-wide and includes more than 90% of the world's contract-drilling rigs. IADC has consultative status with the UN's International Maritime Organization, London.

INTERNATIONAL ASSOCIATION OF GEOPHYSICAL CONTRACTORS

Founded in 1971, IAGC is the trade association which represents the independent service companies and geophysical departments of integrated oil companies which do virtually all of the geophysical data acquisition, processing and interpretation -- primarily utilizing the seismic method -- in search of new crude oil and natural gas supplies in the free world. Geophysical data processing centers, data brokerage and exchange companies, geophysical consulting firms, and geophysical equipment manufacturers and suppliers also are members of the association. Total geophysical data acquisition and processing expenditures in 1985 -- the latest figures available -- totaled approximately $3.5 billion.

NATIONAL OCEAN INDUSTRIES ASSOCIATION

The National Ocean Industries Association (NOIA) is a trade association founded in 1972 and is comprised of over 350 member companies. This figure is down from over 430 members, just one year ago. NOIA represents a wide array of interests involved in all aspects of exploration and development of the nation's offshore petroleum resources. The membership includes, among others, drilling contractors, equipment manufacturers and suppliers, geophysical contractors, oil and gas producers, air and marine transportation firms, engineering and construction companies, service companies and steel companies. Member companies are headquartered in 34 states and have operations in all 50 states.

OFFSHORE MARINE SERVICE ASSOCIATION

The Offshore Marine Service Association (OMSA) is a trade association formed to promote and further the goals and interest of firms providing vessel support and services to all phases of the offshore oil, mineral, construction, and pipe laying industries.

OMSA members number 90 companies operating 2,000 American flag vessels and employing 10,000 seamen.

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

Founded in 1933, PESA is comprised of 210 member companies in the oilfield equipment, service and supply industries ranging from "Fortune 500" enterprises to individual entrepreneurs. PESA member companies operate in 46 states and 75 countries with combined 1986 sales estimated at $10 billion.

RVIA Recreation Vehicle Industry Association
P.O. Box 2999 • 1896 Preston White Drive • Reston, Virginia 22090 • (703) 620-6003

June 3, 1987

Honorable J. Bennett Johnston
Chairman
Senate Committee on Energy
  and Natural Resources
SD-364 Dirksen Senate Office Bldg.
Washington, D.C. 20510

SUBJECT: Hearing on Opening the Coastal Plain of the Arctic National Wildlife Refuge (ANWR) for Petroleum Exploration and Development

Dear Mr. Chairman:

The Recreation Vehicle Industry Association (RVIA) submits the following statement for record in the above-referenced hearing. Basically, RVIA wishes to express its concern for a secure domestic energy supply for the future and supports opening the coastal plain of ANWR to oil and gas development as recommended to the Congress by Secretary of the Interior Donald P. Hodel.

RVIA is the national trade association representing the manufacturers of recreation vehicles and their related suppliers who produce over 95% of this product sold in this country. The RV industry is essentially comprised of small manufacturers and is especially vulnerable to drastic swings in the supply of vehicle fuel. The oil embargo of 1973 had a devastating effect on the industry resulting in an 80% decline in sales and forcing many firms out of business. Analysis of the situation revealed that the drop in sales was caused not so much by the increase in gasoline prices as it was by consumer concern over its availability. As long as our country remains dependent on volatile and insecure foreign oil sources, the repetition of the "gas lines of 73" remains an ever present concern; and this concern is not solely limited to RV manufacturers. There are approximately seven (7) million owners of recreation vehicles in this country, all of whom are dependent upon a steady supply of fuel with which to operate their vehicles. Further, travel and tourism contributed $269 billion to the national economy in 1985 and was the direct or indirect support of almost 7 million jobs. The success of this industry is directly related to the availability of fuel oil.

At a time when the sharp drop in oil prices is causing substantial cutbacks in domestic exploration and production, it is more important than ever that the more promising prospects for major new oil discoveries be explored. The longer our country delays or actively curtails the orderly planning and implementation of exploration and production operations for domestic sources of oil, the more susceptible we become to the volatile conditions brought about by our increasing dependence on foreign sources.

WESTERN OFFICE: 1748 W. Katella Avenue, Suite 206 • Orange, California 92667 • (714) 532-1688

Recently, several RV industry leaders ventured to Alaska to see the technology in place in Prudhoe Bay and to discuss the ANWR region with a variety of experts. They came away convinced that a leasing program in ANWR should be pursued. The oil companies have developed the expertise to ensure environmental impacts are minimized and the potential oil wealth of the area merits opening it to further exploration.

America's energy future must be protected through an aggressive domestic energy policy. RVIA therefore urges the Congress to approve the Department of the Interior's recommendation and permit environmentally sound energy exploration and development of the Arctic National Wildlife Refuge.

Respectfully submitted,

Jerome C Loftus

Jerome C. Loftus
General Counsel

Resource Development Council
for Alaska, Inc.
807 "G" Street, Suite 200, Anchorage, Alaska 99501-3440
Box 100516, Anchorage, Alaska 99510-0516 - 907/276-0700

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June 24, 1987

Senator Bennett Johnson, Chairman
Senate Committee on Energy and Natural Resources
SD358 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Senator Johnson:

The Resource Development Council for Alaska, Inc., is a private statewide economic development organization committed to the orderly development of Alaska's resources. The broadly-based membership of our Council comes from a wide range of economic, social, geographic and ethnic sectors of Alaska. Our membership represents individuals, companies, trade associations, native corporations, universities, chambers of commerce and municipalities throughout Alaska.

The Resource Development Council strongly supports the opening of the Coastal Plain of the Arctic National Wildlife Refuge to oil and gas exploration, development and production. In light of the national interest and industry's ability to operate in an environmentally-sound manner on Alaska's North Slope, full leasing of the Coastal Plain is the best and preferred alternative.

The question before America today on whether to drill for oil on the Coastal Plain is clearly not one of energy development versus environmental values. We must not forget that fifteen years ago preservationists came out of the woodwork screaming that development at Prudhoe Bay and the construction of an 800-mile pipeline across Alaska would ravage the land and wipe out the caribou. Nearly two decades of oil exploration and production in the Arctic have since proved them wrong.

Not only has the pipeline and North Slope oil operations failed to impede caribou migration, caribou populations along the pipeline corridor are booming. The still-unspoiled landscape is attracting record number of tourists. Fishermen have enjoyed historically-high harvests and rural villages continue to enjoy a subsistence lifestyle, but with the added benefits of public facilities and services provided through oil revenues.

Neither is the question one of wilderness versus no wilderness. The 1.5 million-acre Coastal Plain, America's greatest onshore oil prospect, comprises only 8 percent of the refuge. An adjacent area five times as large is already designated Wilderness, permanently protected from any type of development. Overall, 92 percent of the refuge is managed as wilderness and will remain off-limits to development.

Even under the most optimistic production scenario, less than one percent or about 13,000 acres of the Coastal Plain would be affected by production activity, leaving nearly 9 million acres of pristine coastal plain habitat open for caribou calving in Alaska and Canada. And this is not to say that caribou will not continue to calve in new production areas as they do today at existing North Slope oil fields.

Some critics argue that the estimated 19 percent odds of finding oil in the wildlife refuge is not promising enough to justify the risks. On tne contrary, the stated chances are excellent and among the best in the world. In frontier areas such as Alaska, 2 to 4 percent is considered sufficient to justify exploration.

America must not forget many dry holes were drilled at Prudhoe Bay before the giant discovery was made in 1968. It took nearly ten years of additional hard work, pioneering engineering and environmental studies before Prudhoe Bay was finally brought into production. With five billion barrels of production since 1977, Prudhoe Bay has been a vital part of America's energy equation. It currently supplies more than 20 percent of domestic oil. If we had given up our search for oil after the first ten dry holes were drilled at Prudhoe Bay, America would be importing more than half of its oil right now.

A major find on the Coastal Plain would help ease America's growing dependence on foreign oil, saving tens of billions of dollars annually in our balance-of-trade deficit. Development of a major oil field in ANWR would create tens of thousands of new jobs across America. Positive economic effects would be felt in every state. In the last ten years alone, the development of oil fields on America's North Slope has paid out $36-$40 billion in business to suppliers and service firms in all 50 states.

America doesn't face a simple choice between development and conservation. The two go hand in hand. We need to do all we can to find new domestic supplies of oil while implementing progressive conservation measures just to keep our reserves at their current inadequate level.

If we don't look for oil in America's most promising onshore area for the discovery of world-class oil deposits, where else do we look? If we don't pump oil some 200 remote miles above the Arctic Circle, a region where industry has already demonstrated its ability to operate safely, then where else do we go?

Sincerely,

RESOURCE DEVELOPMENT COUNCIL
for Alaska, Inc.

Joe Henri

Joseph R. Henri
President

Shell Oil Company

Suite 200
1025 Connecticut Avenue, NW
Washington, D.C. 20036
(202) 466-1410

Jess Johnson, Jr.
Vice President, Government Relations

JUN 1[illegible] 1987
WASHINGTON, D.C. 20510

June 16, 1987

The Honorable J. Bennett Johnston
Chairman
Senate Committee on Energy
and Natural Resources
SD-364 Dirksen Senate Office Bldg.
Washington, D.C. 20510

Dear Mr. Chairman:

Shell Oil Company would appreciate your including the attached summary statement in the hearing record of your Committee's recent hearings on the Arctic National Wildlife Refuge.

We appreciate the leadership you have shown in organizing and conducting these hearings on this important matter.

Sincerely,

Jess Johnson, Jr.

Attachment

WRITTEN STATEMENT
OF SHELL WESTERN E&P INC.
ON ARCTIC NATIONAL WILDLIFE REFUGE

SUBMITTED TO THE
SENATE ENERGY COMMITTEE
JUNE 12, 1987

WRITTEN STATEMENT OF SHELL WESTERN E&P INC. ON ARCTIC NATIONAL WILDLIFE REFUGE SUBMITTED TO THE SENATE ENERGY COMMITTEE

JUNE 12, 1987

Shell Western E&P Inc., a subsidiary of Shell Oil Company, appreciates this opportunity to comment on the recommendation by the Department of the Interior to open the coastal plain of the Arctic National Wildlife Refuge to oil and gas leasing, development and production.

Shell Western supports environmentally responsible oil and gas development of the "1002" area. We concur with the DOI that this area is clearly one of the most outstanding oil and gas frontiers remaining in the United States, and could contribute significantly to our domestic energy supplies.

Years of actual experience in successfully producing oil on the North Slope proves that industry has the capability and the technology to explore, develop, produce and transport oil in an environmentally acceptable fashion.

It is imperative that we move ahead now with determining the extent of oil and gas resources in ANWR. In the frontier areas, such as Alaska, it can take as long as 10 to 15 years to bring a field into production. This would mean that if leasing were allowed soon, it would be the end of the century before production would begin. This would coincide with the decline of the Prudhoe Bay field, which currently supplies 20% of the U.S. domestic production, and would assist in offsetting that decline.

Oil and gas development in ANWR would benefit the entire nation. Any addition to our reserves, particularly one with the large potential of ANWR, will help combat our nation's over-dependence upon imported oil in the future and reduce our crippling trade deficit.

Also, every state in the nation receives economic benefit from oil and gas production. Since 1974, more than $36 billion has been funnelled into the nation's economy by the development of the North Slope fields and the building of the Trans-Alaska Pipeline.

In summary, we believe that the opening of ANWR for oil and gas exploration and development is a positive step toward ensuring our national security. Industry has the experience and the technology to explore, produce and transport oil in an environmentally acceptable manner, and the nation could be provided with a continued, secure supply of domestic oil from the North Slope of Alaska. Federal and state revenues would increase, jobs would be provided, the economy would be strengthened and our trade deficit would be positively impacted. We urge you to take these and other positive aspects of ANWR development into consideration as you deliberate on this issue.

DOC

STATEMENT OF THE
SOUTHWEST REGIONAL ENERGY COUNCIL
REGARDING THE
ARCTIC NATIONAL WILDLIFE REFUGE COASTAL PLAIN
FOR THE RECORD
June 4, 1987 HEARING
COMMITTEE ON ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE
WASHINGTON, D. C.

The Southwest Regional Energy Council submits the following statement, presenting our views on the Interior Department's proposal to open the coastal plain of the Arctic National Wildlife Refuge (ANWR) to leasing, exploration, and development of oil and gas resources, and respectfully requests that it be incorporated in the record of the June 4, 1987 hearing before the Senate Committee on Energy and Natural Resources.

The Southwest Regional Energy Council is an organization composed of State Senators and State Representatives from Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. Organized in 1975 by governors, legislative leaders, and state energy office directors, the Council provides a forum for the states of the Southwest to develop a regional consensus about public policy issues in the areas of energy production and environmental protection. Through the Council, the legislators identify emerging policy issues in these important areas that impact the region and develop prudent policies to address these issues. In developing public policy recommendations, the Council strives to effectively promote energy and environmental policies which, while assuring state primacy where appropriate, will provide the greatest incentive for the development of our energy resources while maintaining the integrity of our environment.

Throughout the continuing controversy over the future of the coastal plain of the ANWR, the Southwest Regional Energy Council has closely monitored the debate and carefully considered the arguments advanced by each side, since Congress' ultimate decision will have a profound impact on the energy and economic security of the nation at large and our region in particular.

In light of our region's considerable experiences in balancing the demands for domestic energy resource development with the need for maintaining the biological health and integrity of the natural environment, we are convinced that the nation can ill-afford to forego environmentally responsible leasing, exploration, and if successful, development and production of the potentially vast oil and gas resources thought to underlie the ANWR's coastal plain. Accordingly, we adopted the following policy recommendation at our recent Spring Conference in New Orleans, Louisiana:

Arctic National Wildlife Refuge Coastal Plain

Background.

The recent decline in domestic oil and gas exploration, production, and reserves, coupled with an alarming increase in the importation of foreign crude oil and products, has been indicative of increasing U. S. dependence on foreign sources for supply. This dramatic increase in imports, up forty-three percent in the first four months of 1986 over the same period last year, underscores the strategic role that oil plays in America's energy equation.

Current oil production from Alaska's North Slope accounts for twenty to twenty-five percent of our total daily production, but next year will likely see the beginning of the decline of Prudhoe Bay production, with rapid decline expected thereafter in the early 1990s.

Major new discoveries of oil and gas are urgently needed to replace rapidly depleting reserves. The addition of a major new North Slope oil field would significantly reduce our nation's dependence on foreign sources for supply, thereby enhancing our economic and military security. Available geologic and geophysical data indicates that the coastal plain of the ANWR may hold discoveries of oil and gas that could surpass Prudhoe Bay. Federal officials and oil industry analysts have said that the ANWR could have the highest oil and gas potential of any unleased land in North America.

In addition to increasing U. S. energy self-sufficiency, exploration and development in the ANWR would provide economic benefits to all of the individual states. According to a recent survey by the Alaska Oil and Gas Association, $9 billion was spent in the Lower 48 states since 1980 to provide for oil development on Alaska's North Slope. Money was spent in all states both directly and indirectly on the manufacture of parts and equipment, on labor and supplies, on replacement and maintenance items, and on furnishing goods and services to keep the oil flowing through the pipeline and in ships to the Lower 48 states.

Action.

The Southwest Regional Energy Council supports the recommendation of the U. S. Fish and Wildlife Service to offer leases on the coastal plain of the Arctic National Wildlife Refuge for exploration and development of oil and gas resources. Further, the Council urges the federal government to preserve the equitable right of the State of Alaska to share royalty revenues derived from resulting mineral production.

This recommendation was adopted by the Southwest Regional Energy Council on April 4, 1987.

The Southwest Regional Energy Council appreciates your consideration of our views on this important issue.

Wildlife Management Institute

Suite 725, 1101 14th Street, N.W., Washington, D.C. 20005 • 202/371-1808

LAURENCE R. JAHN
President
LONNIE L. WILLIAMSON
Vice-President
DANIEL A. POOLE
Board Chairman

June 16, 1987

The Honorable J. Bennett Johnston, Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Senator Johnston:

We regret not having an opportunity to testify at the Committee's June 11, 1987 hearing concerning oil and gas development on the Arctic National Wildlife Refuge. If it pleases the Committee, we would appreciate having the attached statement included in the hearing record.

Thank you very much.

With highest regards.

Sincerely,

Lonnie L. Williamson

Lonnie L. Williamson
Vice-President

Attachment

LLW:dt

Wildlife Management Institute

Dedicated to Wildlife Since 1911
Suite 725, 1101 14th Street, N.W.
Washington, D.C. 20005
202/371-1808

Statement of Lonnie L. Williamson
before the
Senate Committee on Energy and Natural Resources
on
Oil and Gas Development on the Arctic National Wildlife Refuge
on
June 11, 1987

Mr. Chairman:

I am Lonnie L. Williamson, vice-president of the Wildlife Management Institute. The Institute, staffed by professional natural resource managers, has been dedicated to the restoration and improved management of wildlife since 1911.

The matter of oil and gas development on the Arctic National Wildlife Refuge (ANWR) is a difficult issue. Outstanding wildlife resources depend on that refuge, including caribou, waterfowl, brown and polar bears, wolves, Dall sheep, muskoxen and others. However, the potential for recovering petroleum on ANWR is said to be significant also. And, we are told that our nation will need any oil and gas that may be located.

The Institute does not have the expertise to debate whether recoverable oil and gas deposits exist on ANWR. Neither are we equipped to determine if the national interest would be served at this time by developing any deposits that may be there. As renewable resource managers, however, we do know the needs of ANWR wildlife and that oil and gas operations could have significant negative affects on wild animal populations of national and international importance. Therefore, our concern is to make sure that the public's interest in wildlife is considered and accommodated in the decision-making process.

If Congress decides to open ANWR to oil and gas development, it should do so only under stipulations which assure that the deleterious impacts on fish and wildlife are minimized, and which direct a substantial portion of any oil and gas revenues into programs that support the purposes of the National Wildlife Refuge System.

We would be pleased to work with the committee and develop a broadly acceptable program for oil and gas removal from the Arctic National Wildlife Refuge.

June 15, 1987

Senator Bennett Johnston, Chair
Senate Energy + Natural Resources Committee
Dirksen Senate Office Bldg.
Washington, DC. 20510

Dear Senator and Committee:

I attended The Committee hearings on The Arctic National Wildlife Refuge recently when you interviewed Secretary Hodel on Tuesday and our Governor and other Alaskans on Thursday. This testimony was regarding The Department of Interior "1002 Report" and The future management of the coastal plain within The Arctic Refuge.

Many of you asked good questions and were concerned about real issues. Answers often seemed vague, off The point, and hard to understand. I decided to send you the enclosed for The committee record, in addition to The substantial comments I submitted on The draft 1002 report. I hope These comments arrive in time to be included.

I apologize for The somewhat informal presentation but I am about to hop a plane for one month as a volunteer on another Alaskan refuge. I hope you all have a pleasant and productive trip if you get to visit The Arctic Refuge as part of your deliberations.

Sincerely
Ap E Crosby

April E Crosby (no affiliation)
380 Styx River Road
Fairbanks, Alaska 99709

Background and frequently heard arguments regarding Arctic Refuge:

In 1980, when most of the present federal land conservation units in Alaska were established (Alaska National Interest Conservation Lands Act) the Arctiv National Wildlife Refuge was enlarged and much of it designated wilderness. But 1.5 million acres of the coastal plain was left unprotected (despite the fact that the House of Reps. had voted on wilderness designation at three different points) by the Senate due to its unknown oil and gas potential. Dept. of Interior (Fish and Wildlife Service) was to study this potential and the wildlife values and report to Congress on both, with a recommendation on status and management. This is "the 1002 report."

INDUSTRY & DEPT. of INTERIOR: The oil that is probably beneath the Arctic coastal plain is needed by this country, now; and is critical to national security. This is because the Prudhoe Bay fields (original reserves: 9.5 billion barrels) which supply 22% of US oil, are nearly half empty and will be nearly drained in another decade, at present use patterns. At present use patterns, we could be importing 50-60% of our oil by that time. To avoid vulnerability to mid-East politics we must develop the proposed ANWR reserves, the last great mega-oil find in this country, so that it will be on line by the time Prudhoe is dry.

RESPONSE: It is true that this country needs energy, but it has not been demonstrated that we need oil, or that particular oil, now. We need a well thought through, comprehensive energy policy which matches the source of energy with the use, and which conserves precious, non-renewable energies (like fossil fuels) for those uses which only they can meet. For example, we ought to save our remaining, last reserves for precious and necessary petro-chemical uses in medicine, plastics, etc. in the future. We need to be parsimonious with oil and gas and agressive with the development of renewable sources and with conservation measures. It is hard to accept that we really have an "energy crunch" in this country when so little attention is being paid to renewable and conservation sources. Secretary Hodel told the Senate oversight committee hearings that developing ANWR is part of an all-out energy-independence effort from this administration, but was speechless when Sen. Tim Wirth (D,Colo.) pointed out that the conservation-oriented budget has been cut 91% since 1980. This is clearly not a comprehensive, all-fronts energy plan for the safety of this country, but a short-sighted, band-aid approach which amounts to preferential treatment for one industry at the risk of

important public lands.
(Remember that Reagan, in the name of decreased regulations, tried to block legislation requiring energy efficiency for house appliances; and he let the speed limits for automobiles be raised. He has eliminated energy-efficiency tax incentives and has dismantled the Solar Energy Research Institute, among other moves.)
Also: according to Energy Information Administration, from 1973 to mid-'86, the US reduced the energy-intensity of our GNP by 25% and its oil and gas intensity by 36%. This major stride was effected by more efficient autos, caulk guns and duct tape. When higher-tech methods are fully used, like an insulating gas to fill double & triple-pane windows, which became available in early '87...when this is common in the "Frostbelt" this single technology will conserve more than one Trans-Alaska Pipeline's worth of oil...which need not be supplied. Or, the "Brittle Power: Energy Strategy for National Security" study done for Defense Civil Preparedness Agency (1981) shows that either insulating our buildings better or improving auto gas mileage even more could eliminate US oil imports. Either of these "oilfields" which provide "negabarrels" could provide, by 2005, eight times as much oil as is expected from the Arctic Refuge. They would satisfy every national energy policy goal used in the 1002 report as compelling justification to open ANWR....without the risked environmental impacts. **If the need were clear, we could discuss if and how to get the oil. But the basic premise, that we need this oil now, is unfounded. We shouldn't have to risk other national values until we really need the oil. The Arctic Refuge should be explored as a very last resort.**

INDUSTRY & INTERIOR: The potential here is enormous. We can't let this great resource go unconfirmed, unexplored, and undeveloped. The geology is very similar to Prudhoe-area geology and chances are that we have a Prudhoe-sized find. The oil itself, plus the tangential economic boost to all states, is a needed economic boon to the country.

RESPONSE: The geology parts of "the 1002 report" are very technical and are subject to great disagreement among geologists; they are extremely difficult for the layperson (that's the public) to understand. But it appears that: There is a 19% chance that there is at least one economically viable field in the area. (This may seem like bad odds to us, but it is good among oil company risks.) Given this 1 in 5 chance that there is **any** oil we can get to economically, there a very high chance (95%) that we'd recover

600 million barrels...to a very low probability (5%) that we'd recover a Prudhoe-sized find: 9.2 billion barrels. (So chances that it is Prudhoe-sized are 1 in 5, and then 5% after that.) Given that there is any at all (the first conditioned probability), the mean we would recover is 3.2 billion, about 1/3 the size of Prudhoe.

This is why the conclusion in the text of the Draft 1002 Report to Congress is that further exploration is necessary before we really know what we've got and whether it is worth the risk: "If most of the Ellesmerian rocks are missing from most of the 1002 area, the assessment number [of probable recoverable oil] would be greatly reduced. Drilling one or two wells in critical areas would resolve this question." (p. 54) and "Only actual exploration can provide the information needed to determine the extent and distribution of the resources, and therefore, the potential benefit to the economy." (p. 166) The research and the text of "the 1002 report" support a recommendation for careful, limited further exploration, so we really know what we are talking about. On the other hand, the political overlay of the report (the Executive Summary where Secretary Hodel makes his recomnmendation to Congress) urges total exploration and development of the area.

The recommendation for total leasing and devlopment is inconsistent with the data and the text of the report. (This is why people are charging that whoever wrote the Executive Summary did not read the report.) [redacted]

INDUSTRY & INTERIOR: We can develop the Arctic Refuge in environmentally safe ways; it needn't be caribou or oil: we can have both. We know this from the successes at Prudhoe Bay: they said we'd lose the caribou but in fact the Central Arctic Herd has increased significantly since Prudhoe was developed.

RESPONSE: It is true that the this herd has increased, but as it says in the Draft 1002 Report, "Analogies comparing the effects of current oil development on the Central Arctic Herd and effects of potential 1002 area development on the Porcupine Caribou Herd must be drawn with caution... the PCH would interact with oil development much more extensively and intensively than the CAH has interacted with oil development in the Prudhoe Bay area." (p. 106) Some reasons that the herds should not be compared, and that the increase in one may be irrelevant are:

1) The 1002 area herd (PCH) is much larger, (180,000 vs. 13,000) and we don't know how a larger herd will respond. The post-calving aggregations of the Prudhoe-area herd are a few thousands, whereas the Porcupine Herd aggregations are in the many tens of tousands. The much larger group may respond differently; we don't know.

2) More importantly, while Prudhoe development did occur in the Central Arctic Herd range, it did not occur in crucial calving grounds. There was never significant calving activity in the Prudhoe development area, and there is significant calving activity in the proposed ANWR development acres. You will see photographs of caribou nuzzling up against or roaming among the pipes at Prudhoe; note carefully that these are usually bulls, which are much less sensitive to development than are cows and calves. It's not as much their whole range that is threatened, but the critical calving areas.
3) Furthermore, the fact that caribou remain in the Prudhoe area does not prove that the herd is healthy, just as the existence of bears in proximity to park development does not prove that bear populations are healthy. We may be creating "pipeline caribou" as we have created "park dump bears". In the words of John Titus, a Native resident of a village near ANWR, "We call those Walt Disney animals. Who would go to a zoo to shoot meat for your family table?"
4) Perhaps most tellingly: the fact that the Central Arctic Herd has increased does not mean that caribou love pipelines. What it probably does mean, at least in part, is that caribou thrive where there are no predators. The large predators (wolf and grizzly) have left the area of oil development and hence their prey, caribou, may thrive. This is not necessarily good. It means the ecosystem as a whole has broken down; we don't just want caribou, we want healthy and whole systems.

INDUSTRY & INTERIOR: Caribou wander around all over the place. They can bear their young in Canada or someplace else. The development would only actually occupy 12,000 acres of the 1.5 million acres disputed, and the caribou could do without this small portion.

RESPONSE: (Industry wants these very acres because 25% of the projected oil is under this small portion used so heavily by the caribou.) It's true, the caribou might relocate safely, we don't know. The original Draft 1002 report said that potential dislocation and, by implication, reduction, of the herd was as great as 20-40%, and it distinguished a "core calving area" of special significance. When the final report came out the phrase "core calving area" was missing and the projected relocation/ reduction was called "an editing error". For successful calving, caribou need a combination of few predators, good forage, and available insect relief areas. (Mosquitoes harrass caribou so greatly that they stampede to get away, distracting them from important feeding to rebuild strength after calving for migration, and causing them to run off necessary food/ energy reserves. To avoid the bugs they go to the coast, go into the water, and even swim out on the ice floes.]

Caribou also need a variety of these good calving areas, so that if one has heavy late snow, for example, there are options. The "core calving area" in the 1002 area has been used very heavily in at least 7 of the last 14 years, although not uniformly, every year. At issue here also is that the research discussing the "core calving area" is erratic and incomplete, and, we in Alaska have learned within the last two weeks, the methods for studying the core areas were all jumbled and the data thrown in together. So the data is basically meaningless. This could mean it is not a necessary calving area, or that it is even more so than we thought. The point is, we don't know. We need further information before we risk.

Finally, if the caribou are to relocate successfully, there must be some areas (with all the conditions they need) for them to relocate to. 90% of the North Slope (This refers to the northern side of the Brooks Mountain range, which is a vast, sloping area out across the "coastal plain" ...from 5 to 30 miles wide...to the Arctic Ocean coastline.) is already available for oil and gas development, as is the whole adjacent off-shore area. These acres for conservation, the only area of the coastal ecosystem we could now protect, is already a compromise.

Besides, there are other species needing attention. In a memo from the Alaska Commissioner of Fish and Game about the 1002 area, he points out that the 1002 area is heavily used by tens of thousands of snow geese, which are very reactive to disturbance. In the memo he was not particularly concerned with them because they use the same area as the "core calving area" and at that point it looked like this area would be protected because of the caribou. If the caribou loose it, so do the snow geese, for which there are basically no ways to mitigate the impact.

Finally, there are more subtle species like the polar bears. Apparently 85% of the polar bears den off shore, so people are not too concerned about disturbing their reproduction. However, [redacted] there is, as yet, no plan for where to get the 15 million gallons of water necessary for drilling each well (let alone operating them). People fear industry will try to use the main large spring in the area , which is already nominated as a National Natural Landmark because it is the only spring which stays unfrozen year-round at incredibly cold temperatures. It provides running water for five miles in what is otherwise a frozen andscape. Hence it is very critical for the microorganisms which live through the winter (maybe 6 months at below 30 below) and which then feed the arctic cod, which feed the ringed seals, which feed the polar bears. That spring, which starts the life cycle again each year, is critical. ----So it's not just a simple matter of the caribou going someplace else.

INDUSTRY & INTERIOR: Not only have we learned a lot about arctic engineering so that we know how to overcome the incredible obstacles, but we know from Prudhoe how to do it cleanly. Prudhoe Bay has an impeccable record for environmentally sound development.

RESPONSE: Basically, Prudhoe doesn't have a good or a bad record; it has no record. Secretary Hodel has claimed that extensive studies and data prove no environmental degradation but these studies do not exist. The Feds say that the State is monitoring closely, but the State and the Ak. Department of Environmental Conservation know we aren't either. There was no good baseline data gathered at Prudhoe before they began, so we can't compare well now. Our DEC has been seriously underfunded for years and there are, at the very most, five people trying to keep tabs on the whole nothern half of Alaska. (This is 5 people monitoring environmental quality on the productin of 22% of this country's oil.) There were no air and water quality studies done on the Prudhoe area until the past two or three years and now the data is beginning to show problems. [redacted])

The main problems are air and water quality and the disposition of toxic muds which are a necessary product for well-drilling. [redacted] Toxic drilling muds are a major problem. Prudhoe is right now being subject to a compliance audit to see if they have been following the law for environmental protection.) The oil companies contract out the drilling muds disposal problem, and when the contractors are found faulty, the oil companies still claim that their record is clean. While oil companies have made major efforts in some areas, the "spic and span" image of the Prudhoe oil fields is a Madison Ave.-type myth...and they have been very effective in perpetuating it. [redacted] Congresspeople must look at something more subtle than bull caribou standing under the pipeline.

KARL E. FRANCIS & ASSOCIATES, LTD.
Analysts in Arctic & Subarctic Systems
P.O. Box 82427
Fairbanks, Alaska 99708
(907)479-4551
961 Fieldsboro Road
Townsend, Delaware 19734
(302)378-2210

STATEMENT OF DR. KARL E. FRANCIS WITH REGARD TO PETROLEUM EXPLORATION AND DEVELOPMENT WITHIN THE ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

ENERGY COMMITTEEE
UNITED STATES SENATE

Submitted 11 June 1987

My name is Karl E. Francis. I reside in Eagle River and Fairbanks, Alaska. I have been a voting Alaskan resident since 1961. In the present matter I represent no other party than myself. I make this representation because of my long-term interest in Alaska, its resource economy and my particular interest in the Arctic Coastal areas, on which I have worked professionally for over twenty-five years.

I am trained as a geophysicist and mineral resource analyst, with both my Masters degree and Ph.D. focused on Alaskan resource and terrain problems. As Director of Environmental Affairs for the Alaskan Arctic Gas Study Company and Alaskan Arctic Gas Pipeline Company, I supervised the multimillion-dollar social and biological research programs which, in the mid-1970's, sought to establish both the feasibility and means for the construction and operation of a buried, refrigerated, 48-inch, high-pressure gasline from Prudhoe Bay across the Arctic Coastal Plain and across western Canada to join connecting legs to both the East and West Coasts of the contiguous United States.

Although the Arctic Gas project was killed with the denial of permit by the Canadian National Energy Board on 4 July 1977, the massive environmental research on which its applications for permit were based remains today essentially state of the art. The results of this work comprise the largest body of extant knowledge on the various habitats and potential risks to the natural inhabitants of this area from industrial activity. Little has been added to that understanding and, apparently, much forgotten.

It is frequently the case in the arctic that each new wave of intruder believes itself the first. I am not particularly surprised therefore to find that much of what we already know of the natural habitats of the Arctic Coastal Plain within the Arctic National Wildlife Refuge has been lost in the present debate on whether we should permit petroleum exploration in this area. While I shall not try to remedy that unfortunate situation in this brief statement, I would like to call attention to some of the more startling notions that have been put before this Committee and suggest what I believe to be somewhat more realistic perspectives.

It is not my purpose here to advocate that we either allow or disallow petroleum leasing within the Refuge but rather to attempt to correct and clarify certain points which I know to be badly misrepresented in the testimony already before this Committee. I do believe that it is entirely possible, in fact rather easy, to find and remove any petroleum which may lie under the Coastal Plain and do so without significant damage to the present wildlife or its habitat. On the other hand, what I have seen of the record leaves me with grave doubt indeed as to the will and the ability of those who would be responsible to assure that this is done. The record is, in my view, quite confused.

Let us take a case in point. Although we have a great deal of knowledge and experience on the use and need for proper ice road construction, especially on high-relief, cotton-grass tussuck tundra, the seismic work already permitted by U.S. Fish and Wildlife Service within the the Refuge failed to use this technology properly with the result that there was considerable unnecessary and potentially serious damage to this terrain. This was first reported to me by Dr. Carl S. Benson, one of the worlds's leading authorities on natural ice, who has worked on the Arctic Slope for some thirty years. He characterized the damages as unconscionable. On checking I found there were structural as well as judgemental reasons why this happened, all pretty much inherent to the civil service, and so it seems highly unlikely it will be remedied any time soon. Yet this very work has been represented before this Committtee as evidence that winter seismic exploration is non-threatening.

Indeed, it should be, but the record for such work under direct contract to the Department of Interior is hardly reassuring.

It has been held by a number of witnesses that the only species of animals likely to be threatened by petroleum activity is caribou, specifically the Porcupine caribou herd, and that the herd is threatened primarily in regard to its "core" calving grounds. It has been suggested that there are special grounds which offer more protection from predators than other areas, and if the herd were somehow denied access to these grounds, there might be larger loss of calves to predators, leading to a disastrous decline in the herd. This is essentially the position of the draft 1002 report, which even Interior tried to distance in its final draft. To our embarrassment, this also seems to remain the position of the State of Alaska, a position so incredibly flawed that one hardly knows where to begin to sort it out. It is perhaps even harder to explain where it came from and why so many biologists appear to support it. Yet worse is the corollary that we need to conduct further research to assure such damage will not be done.

Perhaps the most dangerous thing about this position is that it denies and conceals a great many very serious risks to other species. It is conspicuously inconsistent with the conclusions of the massive environmental impact statement for the Arctic Gas project, which focused on the same area but apparently in a very different political circumstances. One must wonder what became of the grave danger that rather innocuous project was to have posed for polar bear, snow geese, barren ground grizzly bear, muskoxen, arctic char, arctic fox and a host of other creatures. It is instructive to note that the present Governor of Alaska, then in the State Legislature, found many more species then to worry about, and he held strong opposition to any industrial intrusion into what was then the Arctic National Wildlife Range. The real issue then, as now, was jobs for Alaskans. The truth is simply that environmental realities are too often overshadowed by political realities, with environmental mythologies serving as troops in political battles

The biological reality is that caribou, with the possible exception of jack rabbits, are perhaps as readily adaptive to oil field activity as any creature on earth. What caribou are not readily adaptive to is roads, roads like the Dempeter Highway, which the Canadian Government built straight through the middle of the caribou migration route without so much as a by-your-leave from anyone, without any kind of environmental impact assessment. If the Porcupine herd is lost, it will be lost on that road. Nothing we would ever do in Alaska could be nearly as threatening.

The fact is that we do know a great deal about the Porcupine caribou herd, at least some of us do, those who can recall all that we do know. We know that the so-called "core calving area" is a recently arisen statistical abstraction with no biological relevance. We know that it is not the calves that are the critical elements of the population but the breeding cows. Calves die, lots of calves die. They are almost designed to die. It is the calves, the youngest of the animals, not the weakest but the youngest, that feed the predators. That's how it works. We have proven it over again, and yet the myths persist. The herd literally chokes the predators by dumping all of its calves in one place in a very short time. And so many survive. What is far more important, however, is the survival of the breeding cows, so they can keep trying. And for the cows it is not where they calve but what happens after that, when they are under the combined stress of lactation and of insect infestation, which determines whether or not they will make it ... assuming they do not have highways to cross.

One kind of pest the caribou do not need is more curious people. It became abundantly and painfully clear in the intensive research we did in preparation for the gasline that the research itself was having far more impact on the animals than anything we might reasonably do in building and operating the gasline. Research, like surgery, is intrusive. Sometimes it is necessary, but always it is dangerous. A Fish and Wildlife Service biologist, who profited considerably from his studies of polar bear, killed more bear trying to figure out how to drug them than have ever been harmed in any way by all the petroleum activity in the entire arctic. He did this to try to determine if the oil industry might harm polar bear.

There remains nothing very mysterious about the Porcupine caribou calving. We have worried the poor animals half to death already. We know all we need to know and a good deal more, certainly enough to plan a properly unintrusive program of oil exploration and development. The Governor of Alaska, as was the Secretary of Interior in the 1002 draft report, has been misused by his own biologists, who are the real beneficiaries of research. They feed on it. One expects biologists to tell you there has to be more research. Such is the nature of the beast.

On the other hand, there is a great deal of work that should be done if petroleum leasing is to go forward in the Arctic National Wildlife Refuge, not research, but the recovery and application of the knowledge we already have to the design of an environmentally and socially responsible leasing program. There are many real environmental concerns. Muskoxen, unlike caribou, are out there in the winter, and they are highly sensitive to aerial activity. Moreover, they are easily and seriously stressed, especially by arctic bluebirds, a curious migratory creature, usually wintering on the Potomac, which seems to have no greater purpose in life than to drive these animals into frenzied defensive circles. We have records of animals killed from bluebird harassment. We have seen serious damages done by no lesser personages than Senators and Secretaries of Interior. Perhaps the worst damage I have ever witnessed was from a party of Sierra Club members who had parked their garish tents and were running about wildly snapping pictures in a narrow corridor, dramatically disrupting the post-calving aggregation of the Porcupine caribou herd. Adding insult to injury one of these photographers then sold a picture of a consequently abandoned calf to the Audubon Society who published it with the suggestion that nature is harsh and that caribou need protection from industry. This northern country and its creatures do not abide much visitation by whatever party, and whatever visitation there is should be closely watched.

It has been suggested by some who favor oil leasing that the industry has a good record in Alaska, that on the basis of this record there should be little public concern about a leasing program in the Refuge. At the Miller Committee hearings the Secretary of Interior was asked if the Congress could do anything to facilitate oil activity, to reduce the regulatory burden of the industry when and if the leasing proceeds, and the Secretary responded in a positive way, offering to seek and recommend ways to reduce that burden.

I have been involved with the petroleum industry for many years, in Alaska as well as in Canada and in the lesser states. I have tried in numerous ways to be of service to the industry. By and large it is a good industry, and by and large it is run by good people. The industry has been good to me, and it has surely been a great asset to Alaska. Because I am familiar with the industry, I know that it is often its own worst enemy. That, I believe, is the case when it seeks to represent itself as having a strong environmental and social conscience and especially when it seeks, through its advocates in the Congress and elsewhere, to be given licence to do as it sees fit, to escape reasonable and essential regulatory control.

Indeed, there have been instances of frivolous and wasteful regulation, at least in its implementation, which the industry has every right and reason to resist and to do so in good conscience. There have been far more instances, however, especially in Alaska, of the industry being dragged, kicking and screaming, to do what turned out to be essential to own good. If it had not been for constant agency vigilance, particularly in forcing the industry to deal intelligently with permafrost and other special arctic conditions with which it initially had little inhouse familiarity and no respect, the TransAlaska Pipeline would have been an unmitigated disaster, and much of what the industry points to with pride at Prudhoe Bay would just not be.

Even so there is much wrong with the environmental record, both through industry obfuscation and plain meanness and through regulatory connivance, blindness and failure. There is clearly no case to be made from the record that the industry can be left to its own devices, even in the pursuit of its own best interest. The oil fields have produced a certain character, a willingness to take ridiculous risks and a toughness to deal with the consequences. This character is not without its charm. But only a fool would put this wild and woolly bunch in charge of anything delicate, or confuse the purposes of this very tough industry with ours or any other national interest. I am made extremely nervous when a public servant or a Congressman seems to miss this point.

Although I am sorry to see my own Governor treed over a biological myth, I believe he is clever enough to find a way out of that tree, and I believe the State of Alaska will finally see a truly responsible and intelligent course of action, hopefully finding the very broad path between the polemics which so far have dominated the testimony on this issue. In spite of that error it is reassuring that the Governor of a state so desperately dependent on petroleum is already struggling to find that course of reason and good judgement.

Especially reassuring was the testimony of the Alaskans who live so near and are so much affected by any alien activity in their country. They have achieved some modicum of economic and political power, although it was clearly seen not to have been uniformly distributed, and are also struggling to find a correct course and to be heard. Each spoke with remarkable understanding and wisdom. In many ways this remains their land, and when the oil is gone, surely only they will remain. It behooves us to listen carefully indeed to what they say and to respect their interest, their wisdom and their concerns.

Yet remarkably little has been said about the role these people who live in the area might have in the design and manner of further oil activity in their country. It has been my experience that they have much to offer and that they can be generous in helping aliens like us to make the most of it in their country. I urge that their role be expanded and given definition, that all of the people be heard, not just those who seem to favor some alien position. The rights of each of these people should loom large in any equation bearing on this land, especially their right to dignified participation. We are all disgraced that any should have had to come, eloquent though they may have been, before the Congress of the United States ill-fitted and ill-prepared.

For those who favor wild places and wild things, there is much to be said in favor of petroleum. Indeed, it is especially interesting along the Arctic Coast to observe the connection between the advent of petroleum and the demise of the American whaling industry. Kerosene may well have saved the whale. In sharp contrast to most human economic activity, with petroleum much can be gained with remarkably little loss. Even hunting and fishing and wild gathering, even recreational activity, have more inherent potential for loss, both in the short and long term. Old oil fields quickly disappear, and new ones can be very quiet.

If there is any case to be made for oil activity on this coastal plain, it is that little damage need be done, little intrusion allowed. For that to happen, however, any leasing program must be carefully planned and closely watched. Unlike caribou watching and biological research, the oil business aims not at the caribou nor the muskoxen nor the bear, and, by its nature, it requires very little room. It would be the height of folly to allow anyone, in whatever guise, to use this intrinsically innocuous incursion as an excuse to do larger damage.

I urge this Committee and the Congress in its deliberations and in its wisdom to see this not as an issue with two opposing and mutually exclusive purposes but as a case which requires clear direction to the principal actors, the industry and the regulators, that any work which goes forward in this rare and valuable country do so intelligently and respectfully. For many this is, indeed, sacred ground. If you have any doubt that it will not be so treated, I urge you to wait for a better time and for better people. It has long been as it is, and so it can well remain.

I am grateful for this opportunity to present these views, and I would be glad to try to answer any questions this Committee might wish to ask.

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